



GLOBAL ENVIRONMENT FACILITY
INVESTING IN OUR PLANET

Naoko Ishii, PhD
Chief Executive Officer and Chairperson

1818 H Street, NW
Washington, DC 20433 USA
Tel: 202.473.3202
Fax: 202.522.3240/3245
E-mail: Nishii@TheGEF.org
www.TheGEF.org

March 12, 2014

Dear SCCF Council Member:

ADB as the Implementing Agency for the project entitled: ***India: Climate Resilient Coastal Protection and Management***, has submitted the attached proposed project document for CEO endorsement prior to final approval of the project document in accordance with ADB procedures.

The Secretariat has reviewed the project document. It is consistent with the proposal approved by the SCCF Council in November 2011 and the proposed project remains consistent with the Instrument and GEF policies and procedures. The attached explanation prepared by ADB satisfactorily details how Council's comments and those of the STAP have been addressed. I am, therefore, endorsing the project document.

We have today posted the proposed project document on the GEF website at www.TheGEF.org. If you do not have access to the Web, you may request the local field office of UNDP or the World Bank to download the document for you. Alternatively, you may request a copy of the document from the Secretariat. If you make such a request, please confirm for us your current mailing address.

Sincerely,

Naoko Ishii
Chief Executive Officer and Chairperson

Attachment: GEFSEC Project Review Document
Copy to: Country Operational Focal Point, GEF Agencies, STAP, Trustee



REQUEST FOR CEO ENDORSEMENT¹

PROJECT TYPE: Full-sized Project

TYPE OF TRUST FUND:SCCF

PART I: PROJECT INFORMATION

Project Title: Climate Resilient Coastal Protection and Management Project			
Country(ies):	India	GEF Project ID: ²	4536
GEF Agency(ies):	AsDB (select) (select)	GEF Agency Project ID:	40156
Other Executing Partner(s):	Ministry of Water Resources (MoWR)-lead coordination agency; State Governments of Karnataka and Maharashtra; Ministry of Environment and Forests (MoEF)	Submission Date:	2014-02-05
GEF Focal Area (s):	Climate Change	Project Duration(Months)	30 Months
Name of Parent Program (if applicable): For SFM/REDD+ <input type="checkbox"/>		Agency Fee (\$):	181,818

A. FOCAL AREA STRATEGY FRAMEWORK³

Focal Area Objectives	Expected FA Outcomes	Expected FA Outputs	Trust Fund	Grant Amount (\$)	Cofinancing (\$)
CCA-1 (select)	1.1 Mainstreamed adaptation in broader development frameworks at the state and country level and in targeted vulnerable sectors and areas. (Components 1 and 2)	Adaptation measures and necessary budget allocations included in relevant frameworks in two states.	SCCF	295,400	1,278,600
CCA-1 (select)	1.2 Reduced vulnerability to climate change in development sectors (Components 1,2 ,3)	Vulnerable physical natural and social assets strengthened in response to climate change impacts including variability in two states.	SCCF	630,232	34,675,000
CCA-1 (select)	1.3 Diversified and strengthened livelihoods and sources of income for vulnerable people in targeted areas (Component 2 and 3)	Targeted individual and community livelihood strategies strengthened in relation to climate change impacts including variability in two states.	SCCF	171,800	9,595,200
CCA-2 (select)	2.1 Increased knowledge and understanding of climate variability and change-induced threats at	Risk and vulnerability assessments conducted and updated.	SCCF	323,900	2,621,400

¹ It is important to consult the GEF Preparation Guidelines when completing this template

² Project ID number will be assigned by GEFSEC.

³ Refer to the [Focal Area/LDCF/SCCF Results Framework](#) when filling up the table in item A.

	the State level and in targeted vulnerable areas (Components 1 and 4)	Systems in place to disseminate timely risk information.			
CCA-2 (select)	2.2: Strengthened adaptive capacity to reduce risks to climate-induced economic losses (Component 1 and 4)	Adaptive capacity of national and State agencies and networks strengthened to rapidly respond to extreme weather events	(select)	211,800	1,372,800
CCA-2 (select)	2.3 Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level (Component 4	Targeted population groups participating in adaptation and risk reduction awareness activities.	(select)	95,800	1,915,000
(select) (select)			(select)		
(select) (select)			(select)		
(select) (select)			(select)		
(select) (select)			(select)		
(select) (select)	Others		(select)		
Subtotal				1,728,932	51,458,000
Project management cost ⁴			(select)	89,250	2876000
Total project costs				1,818,182	54,334,000

B. PROJECT FRAMEWORK

Project Objective: Project Objective: To strengthen the resilience of the coast, coastal infrastructure, and communities to the adverse impacts of climate change through preparation of adaptation guidelines and effective mainstreaming of climate change into coastal protection and management

Project Component	Grant Type	Expected Outcomes	Expected Outputs	Trust Fund	Grant Amount (\$)	Confirmed Cofinancing (\$)
1. Analysis of climate change impacts in coastal areas and preparation of guidelines for climate change adaptation for the whole Indian coast	TA	The impacts of climate change on the Indian coastline are assessed and adaptation guidelines are prepared and endorsed by the Ministry of Water Resources.	1.1 Climate change trends and projections for the Indian coast analyzed and interpreted. 1.2 Development and approval of guidelines and dissemination and operationalization to all coastal states and union/island territories. 1.3 Coastal climate change parameters are incorporated into coastal information systems being developed by central agencies.	SCCF	611,000	100,000

⁴ GEF will finance management cost that is solely linked to GEF financing of the project. PMC should be charged proportionately to focal areas based on focal area project grant amount.

2. Climate Resilient Shoreline Planning and Management in two focal states	TA	<p>In the two focal states of Karnataka and Maharashtra shorelines are effectively managed to adapt to immediate erosion as well as long term climate change impacts</p> <p>Increased role of natural coastal protection measures to meet climate impacts and support community livelihoods</p>	<p>2.1 Shoreline management plans in two focal states incorporate climate change impacts and adaptation response.</p> <p>2.2 Coastal information system in two focal states incorporate climate change parameters.</p> <p>2.3 Sub project designs for Tranche 2 of the baseline project in two focal states incorporate climate change resilience.</p> <p>2.4 Plans and designs for six pilot projects and community organizations are engaged.</p> <p>2.5 Recommendations are prepared to incorporate climate resilience into designs for Tranche 3 of the baseline project.</p>	SCCF	255,000	6,193,000
3. Climate Resilient Coastal Protection in two focal states	Inv	Coastal investments in two focal states incorporate climate resilience.	<p>3.1 Sub-project investments under Tranche 2 of the baseline project incorporate climate change.</p> <p>3.2 Up to six pilot community project in the two focal states are implemented, with 50% of activities involving women.</p> <p>3.3 Communities/ local stakeholders source funds and implement follow on maintenance activities.</p>	SCCF	638,932	41,783,000
4. Institutional strengthening, capacity building and enhanced awareness for climate resilient coastal protection and management	TA	Enhanced capacity for climate resilient shoreline planning and development	<p>4.1. The National Water Academy to be established as the training hub.</p> <p>4.2 About 25 trainers to be selected from various institutes /govt department with</p>	SCCF	224,000	3,382,000

			appropriate skills and experience to be given given a one week training in the guidelines for incorporating climate change adaptation. 4.3 T senior level training courses implemented for selected central level and maritime state officials and stakeholders including the two focal states. 4.4 Awareness materials based on the climate adaptation guidelines are prepared and distributed			
	(select)			(select)		
	(select)			(select)		
	(select)			(select)		
	(select)			(select)		
	(select)			(select)		
	(select)			(select)		
Subtotal					1,728,932	51,458,000
Project management Cost ⁵				(select)	89,250	2,876,000
Total project costs					1818182	54334000

C. SOURCES OF CONFIRMED COFINANCING FOR THE PROJECT BY SOURCE AND BY NAME (\$)

Sources of Co-financing	Name of Co-financier (source)	Type of Cofinancing	Cofinancing Amount (\$)
GEF Agency	ADB	Hard Loan	46,595,000
Local Government	State of Karnataka	In-Kind	4,933,000
Local Government	State of Maharashtra	In-Kind	2,806,000
(select)		(select)	
(select)		(select)	
(select)		(select)	
(select)		(select)	
(select)		(select)	
(select)		(select)	
(select)		In-Kind	
Total Co-financing			54,334,000

D. GEF/LDCF/SCCF/NPIF RESOURCES REQUESTED BY AGENCY, FOCAL AREA AND COUNTRY¹

GEF Agency	Type of Trust Fund	Focal Area	Country Name/ Global	(in \$)		
				Grant	Agency Fee	Total

⁵ Same as footnote #4.

				Amount (a)	(b) ²	c=a+b
AsDB	SCCF	Climate Change	India	1,818,182	181,818	2,000,000
(select)	(select)	(select)				0
(select)	(select)	(select)				0
(select)	(select)	(select)				0
(select)	(select)	(select)				0
(select)	(select)	(select)				0
(select)	(select)	(select)				0
(select)	(select)	(select)				0
(select)	(select)	(select)				0
(select)	(select)	(select)				0
Total Grant Resources				1,818,182	181,818	2,000,000

E. CONSULTANTS WORKING FOR TECHNICAL ASSISTANCE COMPONENTS:

Component	Estimated Person Weeks	Grant Amount (\$)	Cofinancing (\$)	Project Total (\$)
Local consultants*	52.00	316,000	1,861,000	2,177,000
International consultants*	22.00	550,000	1,443,000	1,993,000
Total		866,000	3,304,000	4,170,000

* Details to be provided in Annex C.

F. PROJECT MANAGEMENT COST

Cost Items	Total Estimated Person Weeks/Months	Grant Amount (\$)	Co-financing (\$)	Project Total (\$)
Local consultants*	0.00	0	68,000	68,000
International consultants*	20.73	22,803	86,000	108,803
Office facilities, equipment, vehicles and communications*		20,000	220,000	240,000
Travel*		0	480,000	480,000
Others**	Government Project Management Staff Costs	0	1,600,000	1,600,000
	Misc Admin & Support Cost (GEF:42,197 USD)	46,447	422,000	468,447
	Contingencies (GEF:4,250 USD; Co-financing: 422,000 USD)			
Total		89,250	2,876,000	2,965,250

* Details to be provided in Annex C.

** For others, to be clearly specified by overwriting fields *(1) and *(2).

G. DOES THE PROJECT INCLUDE A "NON-GRANT" INSTRUMENT? No

(If non-grant instruments are used, provide in Annex E an indicative calendar of expected reflows to your Agency and to the GEF/LDCF/SCCF/NPIF Trust Fund).

H. DESCRIBE THE BUDGETED M & E PLAN:

The Monitoring and Evaluation plan is presented in Table 1, below. The monitoring will build on the baseline project monitoring as per the requirements of the ADB Loan Faculty Administration Manual 2011.

Day to day monitoring of the project implementation progress will be responsibility of the consultants based on the project's annual work plan. Periodic monitoring of the project progress will be linked to the ADB review missions for the baseline project--the review missions will examine progress of both the baseline and the GEF-SCCF project.

An independent monitoring assessment will be assigned to appropriate national institute who would conduct independent monitoring and evaluation. The estimated cost of this work is \$40,000, which will cover 5 person months of national professional staff and related survey/monitoring costs. The project will be subjected to at least two independent external evaluations. The monitoring institute will conduct an independent mid-term evaluation at the end of the first year of implementation to determine progress being made towards the achievement of outcomes and will identify course correction as needed.

An independent final evaluation will take place within three months of the project completion. The final (or terminal) evaluation will also look at impact and sustainability of results, including the contribution to capacity development and the achievement of adaptation benefits. The institute will also be responsible for completion of the GEF-SCCF Climate Change Adaptation Monitoring and Assessment Tool (AMAT), which will be updated at project mid-term and final evaluation

Table 1 Monitoring and Evaluation Plan

Nr	Monitoring Activity	Indicator	Baseline	Target	Sources of Verification	Notes/ timing
1. Component						
1.1	Evaluation of climate change impact assessments and preparation of adaptation guidelines (Component 1)	<p>Climate change trends and projections for the Indian coast analyzed and interpreted.</p> <p>Planning and design guidelines prepared and endorsed by panel of experts and national level Technical Committee</p> <p>Coastal climate change parameters are incorporated into information systems being developed by two focal states and central agencies</p>	<p>Current knowledge of coastal climate change is limited with no quantitative estimates of climate change.</p> <p>No integrated and quantitative analysis of different climate impact parameters.</p> <p>Current design standards and norms do not address climate change issues.</p> <p>Designers and officials do not have official remit to incorporate climate change resilience or increased budget allocation.</p> <p>Current information systems of the MoWR and states poorly developed and do not include climate change parameters</p>	<p>Integrated assessment of climate change parameters for the Indian coast.</p> <p>Climate change impacts assessed and, planning and design criteria incorporated into guidelines</p> <p>Technical committee endorse guidelines.</p> <p>Adaptation guidelines are communicated by MoWR to all maritime states and union/island territories.</p> <p>The design of the information system being developed by MoWR incorporates climate change parameters.</p> <p>Climate change information compiled for the two focal states.</p>	<p>Adaptation guidelines report.</p> <p>Adaptation guidelines report</p> <p>Minutes and recommendations of technical committee meeting.</p> <p>Communication letters of MoWR</p> <p>Review of Information System being developed in two focal states and MoWR.</p>	<p>Three assessments- baseline midterm and final. (months 3, 12 and 24)</p>
1.2	Status of climate resilient shoreline planning and management in two focal	Shoreline management plans in two focal states incorporate climate change	Shoreline plans and coastal information by mid 2013 at start of	Shoreline plans to be 100% complete and incorporate climate	Review of SMPs and coastal information system in two focal states by	Three assessments- baseline, midterm

Nr	Monitoring Activity	Indicator	Baseline	Target	Sources of Verification	Notes/ timing
	states (Component 2)	<p>impacts.</p> <p>Coastal information system in two focal states incorporate climate change information.</p> <p>Sub project design in two focal states incorporate climate change resilience</p> <p>Planning and design for six pilot projects are prepared and community organizations are established and engaged.</p>	<p>the TA would be 25% complete. Plans would have no or very limited assessment of climate change.</p> <p>Current design approaches and standards.</p> <p>Pilot project sites would have no protection measures or limited protection based on current standards.</p>	<p>change vulnerability assessments and proposals for adaptation.</p> <p>Coastal information in two focal states system incorporate climate change parameters</p> <p>Sub project designs incorporate climate resilience measures.</p> <p>Designs for pilot projects are fully participative and supported by communities and incorporate climate resilience</p>	<p>independent assessor</p> <p>Tranche 1 sub project design reports November 2010 with design revisions in 2012. Tranche 2 sub project design reports scheduled for 2013/14.</p> <p>Evaluation pilot project design and minutes of meetings with communities</p>	<p>and final.(months 3,12 and 24)</p>
1.3	<p>Assessment of progress of climate resilience of coastal protection investments in two focal states.</p> <p>Evaluation of community pilot projects (Component 3)</p>	<p>Sub Project Investments under Tranche 2 of the baseline project incorporate climate change resilience.</p> <p>Up to six pilot community project in the two focal states are implemented with 50% of activities involving women.</p> <p>Communities/local stakeholders source funds and implement follow on maintenance activities (number of communities in project area)</p>	<p>Sub-projects will be designed following standard design criteria in the absence of the project.</p> <p>Survey of situation in communities at six selected sites prior as well as at six control sites prior to initiating pilot projects.</p>	<p>At least 60 % of sub-project investments under Tranche 2 incorporate climate change considerations</p> <p>At least six communities in the project area adopting coastal protection measures and maintenance activities.</p> <p>Communities are empowered to implement coastal protection and natural protection measures are in place</p>	<p>Post construction assessment of sub project sites.</p> <p>Participatory rural appraisals and GPS surveys of beach and dunes including assessment of extent of natural protection at six pilot sites and six control sites.</p> <p>Daily records of type and values employment created and during the</p>	<p>Annual assessments (month 12 and 24)</p> <p>Baseline surveys at pilot sites and control sites to be completed once sites are selected.</p>

Nr	Monitoring Activity	Indicator	Baseline	Target	Sources of Verification	Notes/ timing
1.4	Status of institutions, capacities and awareness in relation to climate change and adaptation (Component 4)	<p>Training programs in two focal states incorporate climate change adaptation. National Water Academy established as training hub.</p> <p>Cadre of 25 trainers from various states and national institutions are given training in the guidelines for climate change adaptation.</p> <p>Two senior level training courses for selected central level and maritime state officials and stakeholders are implemented</p> <p>Awareness materials are prepared and distributed.</p>	<p>Limited non quantitative knowledge of coastal climate change impacts at all levels.</p> <p>No quantitative knowledge of climate change impacts.</p>	<p>High level of awareness of coastal climate change including good quantitative knowledge of impacts and adaptation responses by key stakeholders.</p> <p>Medium to high level of awareness of climate change and understanding by state government in the two focal states and CWC/MoWR</p>	<p>pilot projects.</p> <p>Questionnaire to assess understanding of selected government institutes.</p> <p>Questionnaires to communities and other stakeholders to assess understanding of climate change.</p> <p>Training reports including feedback from participants.</p>	<p>Three assessments- baseline, midterm and final (months 3, 12 and 24)</p>
2. GEF-SCCF Climate Change Adaptation Monitoring and Assessment Tool (AMAT)						
2.1. Baseline Information-prepared as part of the submission for CEO endorsement						
2.2 Final Project Target -prepared as part of the CEO endorsement						
2.3 Mid Term Results to be completed at midterm of project month 15						
2.4 Terminal Results to be completed at end of project month 30						

PART II: PROJECT JUSTIFICATION

A. DESCRIPTION OF THE CONSISTENCY OF THE PROJECT WITH:

A.1.1. The [GEF focal area/LDCF/SCCF strategies/NPIF Initiative](#):

Consistent with the adaptation priorities identified in India's Initial National Communications to the UNFCCC (2004), the project will implement targeted interventions to support the needs of coastal climate change adaptation. It will catalyze and leverage additional co-financing resources from ADB Sustainable Coastal Protection and Management Investment Program (SCPMIP). The GEF-SCCF financing will help to cover additional costs relating to climate change studies, planning and design to ensure the SCPMIP supported investment projects incorporate enhanced resilience to climate change and help the projects objectives of achieving sustainable development under a changing climate. At national level the project's focus is directed at safeguarding India's coasts against future climate risk, by analyzing climate trends and projections, preparing planning and design criteria for climate adaptation and pursuing a range of adaptation measures in climate change resilience building and institutional strengthening. The project is directly aligned with the scope of GEF-SCCF expected interventions, as articulated in the GEF-SCCF programming paper. As climate impacts fall disproportionately on the poor, the project also explicitly recognizes the link between adaptation and poverty reduction by ensuring that coastal protection and coastal infrastructure contains heightened climate-resilience in supporting the sustainability of income generation within coastal communities with special emphasis to support the role of women. In addition, the project focuses strongly on systemic support for mainstreaming, aligning directly to GEF's intended shift to a more programmatic approach to GEF-SCCF adaptation financing.

The project will support the development of guidelines for integrating climate change resilience measures into shoreline management planning and the design of climate resilient coastal protection and other coastal infrastructure. The GEF-SCCF financing will support community level coastal protection pilot projects which will provide a base and demonstration for upscaling under the baseline SCPMIP supported investment project. The lessons learned and technical capacity developed through the project will further enable broader climate change adaptation mainstreaming in development planning at state and national levels.

As stated above, the GEF-SCCF grant will leverage the mainstreaming of climate change adaptation within coastal protection investments supported by the ADB's SCPMIP which is being implemented as a three tranche program of investments with a total funding envelope of US\$400 million over eight years (i.e. from 2012 to 2020). At an outcome level the interventions described above will contribute directly to GEF Climate Change Adaptation, and key outcomes including:

CCA-1 - Outcome 1.1 “Mainstreamed adaptation in broader development frameworks at country level and in targeted vulnerable sectors and areas”, through the analysis of climate change impacts and mainstreaming of climate change resilience in participatory shoreline management planning, preparation of guidelines for climate change adaptation endorsed by a national technical committee and incorporation of provisions for climate change adaptation into sub project designs in two focal states;

CCA-1 - Outcome 1.2: “Reduce vulnerability in development sectors” through incorporation of climate resilience parameters in planning and design of coastal protection and infrastructure in two focal states;

CCA-1 - Outcome 1.3 “Diversified and strengthened livelihoods and sources of income for vulnerable communities in targeted areas,” by reducing impacts on property and livelihoods due to coastal erosion and through the protection of coastal livelihoods through interventions ensuring the integrity of coastal ecosystems including the beaches and development of new income generation opportunities through community based projects.

CCA-2 - Outcome 2.1 “Increased knowledge and understanding of climate variability and change induced risks at country level and in targeted vulnerable sectors and areas,” through analysis of climate and interpretation of latest climate change projections, and preparation of planning and design criteria for coastal climate change adaptation for the Indian coast. The application of the climate change analysis and development of design

criteria will be taken up in the two focal states of Karnataka and Maharashtra through a process of shoreline planning, vulnerability assessments and the development of adaptation measures and incorporation of climate resilience measures into the baseline sub-project designs and investments. The strengthening of institutional knowledge and capacities will be taken up via training of trainers, as well as high-level training for central agencies and officials from the project's maritime states.

A.1.2. For projects funded from LDCF/SCCF: the LDCF/SCCF eligibility criteria and priorities:

Based on GEF priorities (outlined within November 2010 GEF Council paper,) the project will focus on adaptation to address two priority areas of GEF-SCCF financing. These include: (i) infrastructure development; and (ii) integrated coastal zone management. The interventions proposed within this project are country-driven, designed to be cost-effective, and specifically aim to integrate climate change risk considerations into coastal zone infrastructure investment. The project also closely responds to national and sub-national sustainable development and poverty-reduction strategies, and addresses adaptation priorities identified in the country's Initial National Communication to the UNFCCC.

A.1.3 For projects funded from NPIF, relevant eligibility criteria and priorities of the Fund:

N/A

A.2. National strategies and plans or reports and assessments under relevant conventions, if applicable, i.e. NAPAS, NAPs, NBSAPs, national communications, TNAs, NIPs, PRSPs, NPFE, etc.:

The Initial National Communication to the UNFCCC: India highlighted that future climate change in the coastal zones is likely to manifest through the aggravation of some of the existing coastal issues including erosion, flooding, subsistence, deterioration of coastal ecosystems. This would have significant implications for the coastal population and agricultural and other developmental performance of India. The importance of climate change is recognized at the highest levels of Government in India. In June 2007, the Prime Minister's Council on Climate Change was formed to coordinate national action plan for assessment, adaptation and mitigation of climate change.

National Action Plan for Climate Change NAPCC is of special relevance to the project. The Water Mission (one part of the NAPCC) with respect to coastal zones the Water Mission calls for the collection of necessary additional hydro-meteorological and hydrological data for proper assessment of the impact of climate change; and data and measures to address increased saline intrusion of coastal and island aquifers due to rising sea levels. To date there is quite limited progress on the assessment of the climate in the coastal zones under the NWM of the NAPCC. The GEF-SCCF support will support the up-scaling of the two coastal information systems being developed in Karnataka and Maharashtra to the central level as well as preparation of adaptation guidelines, training of trainers and training in the adaptation guidelines.

State Action Plans for Climate Change (SAPCC) under the direction of MoEF have been prepared for most states; the plans are directed at translating national policy into action at the state and local levels, and decentralizing NAPCC objectives into local contexts. The SAPCC for Karnataka and Maharashtra are especially relevant. The compiled outputs for the SAPCCs for all the maritime states will form a key input towards the development of coastal climate change adaptation strategies and guidelines. Especially relevant are the vulnerability assessments and adaptation proposals of the SAPCC for the coastal areas. The complementary resources of the SAPCC and GEF-SCCF projects will allow for more in depth analysis and development of targeted strategies and guidelines for climate change adaptation in the coastal zones of focal maritime states.

The 12th Five Year National Plan (2012-2017) has been drafted but not yet issued. The report of the Steering Committee on Water Resources and Sanitation for the Twelfth Five Year plan has been prepared by the Planning Commission, in consultation with MoWR and other ministries. The report identifies the need for further studies and research needed for obtaining detailed, precise and area-specific information on the impact of climate change on water resources, and on the vulnerabilities of certain areas and settlements such as coastal and low-lying areas. The steering committee report recommends that participatory action for mitigation and adaptation need not wait for those studies, but should be taken in hand and considered immediately. The report also identifies that data improvement, including a coastal management information system, should be viewed as a national effort with: the central government taking the lead in working out protocols and procedures for collection and validation of data by all agencies; creating appropriate institutional arrangements to ensure independent and professional conduct of the surveys; providing financial and technical support to the States, and; ensuring that all agencies follow prescribed

protocols and transmit the data to the central pool.

GEF-SCCF support will help prepare a compilation and analysis of climate change information and development of adaptation criteria and guidelines for planning and design for climate resilient coastal protection and management. The GEF-SCCF support will also help strengthen the linkage between the two SCPMIP coastal data systems, as well as linkage with relevant climate change information systems under other programs including MoEF and its support for the establishment of a central climate change information system in CWC. The GEF-SCCF will develop guidelines, support training and awareness programs through training of trainers, as well as senior level staff training for central agencies and other maritime states.

PROJECT OVERVIEW:

B.1 Description of Baseline Project and Problems it Seeks to Address

B.1.1 Baseline Project Rationale

The '**Sustainable Coastal Protection and Management Investment Program (SCPMIP)** is the project's baseline initiative, supported through a multi-tranche ADB loan.. The baseline program has been designed to address immediate coastal protection needs and coastal instability using environmentally and socially appropriate solutions in the states of Karnataka, and Maharashtra.⁶ The baseline aims to develop institutional capacities to meet the long-term needs of sustainable coastal protection and management, and support initiatives to increase the participation of the private sector and communities in coastal protection and management. At present, the baseline program incorporates only very limited consideration of climate change issues. The GEF-SCCF project is being developed to incorporate important climate change adaptation planning to inform the significant scope and potentials of this baseline.

Development problems: India has a coastline of 7,525 kilometers (km) of which 5,425 km are along the nine national coastal states of the mainland, with an additional 2,100 km of coastline in offshore islands comprising union territories. About 20%–25% (about 250 million people) of India's population lives within 50 km of the coast of which 70% reside in rural areas. The coastal environment is also of importance to major economic and production sectors, including important fisheries, agriculture, tourism, ports and maritime shipping, and other major transport and communication sectors and their related infrastructure. Effective and sustainable management of the shoreline is vital to economic and social development, and has great bearing on the economic sustenance and sustainable livelihoods of the large sector of population living in India's coastal areas.

All the coastal states and territories are affected by coastal erosion to some degree. Coastline erosion over the years has intensified. In the states of Karnataka, and Maharashtra; the focus of the baseline program⁷ about 50% of the 1,100 km of coastline is facing marked erosion, with an additional 530 km prone to erosion and 330 km requiring immediate protection. Rock sea walls are the prime measure to address erosion; nevertheless, at the current rate of seawall construction the shorelines and , key coastal ecosystems are projected to be increasingly and severely degraded within the next 20 years. The rise in sea levels and the likely increased frequency and intensity of storms will aggravate this, with serious economic and environmental consequences for coastal states. The sea level rise is projected to be in the range of about 0.3m in the Indian subcontinent by the middle of the century; a projected rise of 1 meter in sea level by the end of the century could displace 7.1 million people in India, with a loss of 5,764 square km of land and 4,200 km of roads.

Coastal erosion is caused by both natural events (such as storms and currents) and those anthropogenic (including seawalls, dams, riverbed quarrying, harbors, and inlet destabilization effects). In India, there are numerous examples showing how human activities have contributed to or caused coastal erosion. These include change in sediment supply through dredging, river damming, sand mining and the construction of littoral barriers such as groins, jetties, and ports. Beach degradation is also caused by ad hoc coastal development and urbanization, leading to loss of vegetation and further erosion.. Sediment traps (such as dredged navigational channels) and alteration to wave processes caused by jetties and ports also play a role. Coastal erosion is responsible for loss of land, houses, infrastructure, and business opportunities; and poses a high risk to human well-being, economic

⁶ These three states were selected after consulting the states and central government, and considering coastal erosion and instability status in these states. The loan agreement has been signed by Maharashtra and Karnataka; the participation of Goa may come later in the program but this is still under discussion. No specific GEF interventions are proposed for Goa.

⁷ ADB. 2007. *Technical Assistance to India for Preparing the Sustainable Coastal Protection and Management Project*. Manila

development, and ecological integrity. The impact will be much more extensive and widespread in the coming years, as the coastline is increasingly subject to a wide range of economic developments, many of which create conflicts and pressures on the already disturbed natural coastal environments. Rural poor coastal communities are the most vulnerable to the impacts of erosion and poor coastal management. Many of India's rapidly growing urban areas are also vulnerable to coastal erosion.

Threats and constraints to coastal ecosystems. Despite their tremendous ecological and economic importance, India's coastal ecosystems are under increasing threat. There are numerous direct and indirect pressures arising from different types of economic development across the country. It is clear that the cumulative impacts of pressure on the coastal ecosystems are intensifying as a result of both India's economic and population growth; coastal communities are affected through erosion and other impacts, as the drivers of change, degradation or loss of coastal ecosystems and ecosystem services. The threat of climate change is over and above this. The degradation of coastal habitats affects the wellbeing of all people in ways that cannot be measured in economic terms. The coastal wetlands, of India play an extremely valuable role, these include tidal mudflats (23,620 sq. km) and mangroves (4,870 sq. km). These wetlands are one of the most productive ecosystems and play a significant role in the ecological and economic sustainability of a region, and are essential to ecological and physical characteristics of the coast. Disturbances to the coastal wetlands either from anthropogenic or climate change impacts can be very significant.

Development coordination. There has been limited external assistance for coastal protection and management in India. Nearly all investment funding has been from the states, central government, and the private sector. The lack of external and/or coordinated assistance has resulted in a lack of exposure to new ideas and practices. The World Bank recently approved the Integrated Coastal Zone Management Project. The World Bank and ADB worked closely to harmonize interventions for coastal protection in India. The focus of the World Bank's project is on coastal zone management, mapping, and planning; and piloting integrated coastal zone management in the states of Gujarat, Orissa, and West Bengal. The focus of the proposed ADB-supported investment program is on designing coastal erosion protection infrastructure in the states of Karnataka, and Maharashtra.

B.1.2 Baseline Project Overview

Investment plan. An indicative long list based on prioritization of subprojects has been carried out for financing under the investment program. All subprojects to be included under the investment program will have to meet the selection criteria and defining: (i) erosion status; (ii) technical, institutional, and economic feasibility; (iii) compliance with social, environment and related safeguard requirements; (iv) endorsement by stakeholders, including agreements to support the project; and (v) state priority. The proposed intervention area includes the coast together with deltas along with estuaries, which are highly populated with intensive human land use areas. The estuaries and have been identified, by the Intergovernmental Panel on Climate Change (IPCC) as the coastal ecosystems most vulnerable to climate change and sea-level rise.

Road map. A road map (a sector strategy), comprising the policy and institutional actions and an investment program, has been prepared to support the two focal states to move toward integrated and sustainable coastal protection and management. The objective of the road map is to reduce coastal erosion and instability in the states. The road map envisages actions to protect and manage the shorelines of the three states, meeting the needs of communities and other stakeholders, while maintaining the ecological integrity of the shorelines.

Multi-tranche Financing Facility (MFF). The baseline project is based on the MFF modality which divides the loan into Tranches; the first Tranche of the loan has now be firmed up and committed to, whilst investments for the 2nd and 3rd Tranches remain indicative and are yet defined. The MFF provides the opportunity and incentives for high implementation quality since future tranches are subject to the performance of the ongoing tranche, and sufficient readiness for implementation. The MFF is a flexible approach which allows changes and refinements to be incorporated as the project progresses; this enables the outputs of the GEF-SCCF project to also be incorporated into 2nd and 3rd Tranches of the baseline project.

B.1.3 Baseline Project; Impact, Outcome and Outputs

The impact of the investment program will be improved income and reduced poverty of the coastal communities in the subproject areas of the coastal states of Karnataka, and Maharashtra. The outcome of the investment program will be protected and managed shorelines in the three states, meeting the needs of stakeholders and protecting the environment. The key performance target is protecting and managing 150 km of coastline with government,

community and private sector participation. The GEF-SCCF project will build on baseline project outputs focusing on the incorporation of climate change impacts. The investment program outcome will be achieved through the following outputs:

Output 1: Sustainable Plans and Management for Shorelines Developed

(i) Participatory shoreline management plans (SMP). SMPs will be prepared for the coastlines of the two focal states to meet long-term shoreline management needs; plans will be participatory and integrated with the participation of women. Shoreline plans will address key issues of the coastal processes, shoreline land use, and present proposals for the long-term sustainable management and protection of the shoreline. The plans will also identify potential economic development opportunities in coastal areas.

(ii) Coastal management information systems. Coastal management information systems will be developed and established for the two states. The databases will source information from national and state level institutions and other specialized agencies, including the Ministry of Environment and Forests. These will establish effective mechanisms for sharing information with state and district level coastal agencies and stakeholders. Maintenance of the management information system will be a key responsibility of the coastal information management units (CIMUs) to be established within each SEA.

(iii) Management and planning of subprojects. The investment program will support management and supervision of subproject implementation, and preparation of detailed design of subprojects for future tranches. Planning and design of projects for implementation will be selected based on the outputs of the shoreline management planning process. Selected projects will be formulated and submitted for preliminary selection and assessment. Feasibility studies, including numerical modelling as required, will be carried out for all projects to assess their technical and economic viability as well as their social and environmental impacts.

Output 2: Coastal Erosion and Instability Managed and Reduced

(i) Reducing coastal erosion, salinity and instability. Coastal erosion, salinity and instability will be reduced through economically viable protection works, using environmentally and socially appropriate solutions. Key areas of other coastal protection interventions include (i) navigation inlets and training of river and drain mouths; (ii) natural protection through the development and planting of dunes, and planting of mangrove or other trees for protection and shelterbelts; and (iii) coastal management, including water quality, dredging, and reclamation.

(ii) Community and private sector engagement. The key components will be (i) training provided to at least six local communities in shoreline management and income-generating activities, and (ii) new initiatives toward income generation of local communities. The states will take steps toward encouraging private sector investments in coastal protection and management, including putting in place enabling policies and guidelines for private sector participation in coastal protection and management as feasible.

Output 3: Enhanced Capacity for Shoreline Planning and Development

The baseline output will aim to build:

(i) Capacities at district and state levels will be enhanced to prepare and implement participatory SMPs. Coastal Infrastructure Management Units (CIMU)s will be established and shoreline management plans will be prepared and updated at 5 year intervals. SMPs will form the basis of long-term shoreline protection and management.

(ii) Enhanced capacity of local experts and agencies and government institutes. The capacity of local experts and agencies, local bodies, and stakeholders will be enhanced to provide specialist support for planning, modelling, design, checking, and review for coastal protection and management.

(iii) Improved capacity of communities and stakeholders. The mandates and capacities of communities and stakeholders will be improved to manage and maintain . Locally based community stakeholders and beneficiaries will support project coordination and monitoring during implementation, as well as management and maintenance of coastline..

(iv) Mandated state executing agencies. The states will take all necessary steps to empower the SEAs to coordinate all coastal management programs. Towards this, the capacity of the SEAs will be enhanced. Establishment of a CIMU within the State Executing Agencies (SEA) will support the coordination of the management information system.

B.1. 4. Baseline Project Investment and Financing Plan

The SCPMIP investment cost is estimated at \$404.6 million including taxes and duties of \$35.5 million to be

financed by the government. The loan agreement is based on three participating states; Karnataka, Goa and Maharashtra. Goa is not included in Tranche 1 and involvement in Tranche 2 and 3 is not fully confirmed. No specific GEF-SCCF activities are proposed for Goa however the national level adaptation guidelines and training would be directed to all maritime states.

The investment and the financing plan are presented in **Table 2**, below.

Table 2 Program Investment Plan

Item		Whole Program (\$ million)	Tranche 1 (\$ million)
A.	Base Costs		
1.	Planning and design	19.8	6.3
2.	Coastal erosion and instability reduction	309.3	41.8
3.	Capacity development	19.7	8.2
Subtotal (A)		348.8	54.3
B.	Contingencies	41.9	4.2
C.	Financing Charges During Implementation	13.9	0.8
Total (A+B+C)		404.6	62.7

The ADB loan is for an amount up to \$250 million from ADB's ordinary capital resources to help finance part of the investment program. The MFF will consist of three tranches, subject to the government's submission of related periodic financing requests, execution of the related loan and project agreements for each tranche, and fulfillment of terms and conditions and undertakings set forth in the framework financing agreement (FFA).

An agreement for the first tranche (\$51.6 million loan) was signed on 17th August 2011. The program will improve incomes and reduce poverty in coastal communities in Karnataka and Maharashtra states by addressing immediate coastal instability problems and medium-term needs of coastal protection and management.

The total cost of first tranche is \$62.7 million for the two subprojects in the states of Karnataka and Maharashtra. The first tranche of the MFF will have a 25-year term, including a grace period of 5 years, an annual interest rate determined in accordance with ADB's London interbank offered rate (LIBOR)-based lending facility, a commitment charge of 0.15% per year, and such other terms and conditions set forth in the FFA and the loan and project agreements, the financing plan is shown in **Table 3** below.

Table 3 Financing Plan

Financing Plan (\$ million)		
Source	Amount	Share of Total (%)
Asian Development Bank	250.0	61.8
State governments	119.8	29.6
Other Sources including Private sector	34.8	8.6
Total	404.6	100.0

B.1.5. Baseline Project Implementation

The responsibility for overall project management and implementation is the: Karnataka Public Works, Ports and Inland Water Transport Department, and Maharashtra Maritime Board. The government of each state will establish a program steering committee, to be chaired by the SEA departmental secretary, to provide broad project oversight; policy guidance; facilitate interdepartmental coordination; and help institutionalize effective mechanisms to plan, improve, and manage coastal management initiatives. A program management unit (PMU), headed by a full-time project director, will be established in each state. The implementation arrangements are summarized in **Table 4**, below.

Table 4 Baseline Project Implementation Arrangements

Aspects	Arrangements
Implementation period	2011– 2019
Estimated project completion date	Early 2020
Project management	
(i) Oversight body	Program steering committee of each state
(ii) Executing agency	Karnataka Public Works, Ports and Inland Water Transport Department, and Maharashtra Maritime Board.
(iii) Key implementing agencies	As above
(iv) Project implementation unit	A program management unit, headed by a full-time project director has been established in each state.
Procurement	All goods and services to be financed under the multitranche financing facility will be procured in accordance with ADB's Procurement
Consulting services	A team of international and national consultant have been contracted to support the 1st tranche of the program over 40 months to mid 2015

B. 2. Problems the Baseline Project Seeks to Address

The coastal protection strategy in India aims at protecting the land behind the beaches and overall economic growth. Protecting the coastal areas and the environment are relatively new concepts in India. The most frequently applied methods for coastal protection have been through the use of hard structures, such as seawalls or groins. Long-term plans to manage coastal erosion are available. However, resource constraints result in the measures being undertaken to target the more vulnerable sections of the coasts and as local emergency measures. Such interventions provide mostly land protection. Seawalls and groins continue to be preferred measures though they do not necessarily address the root cause of the problem. As the pressure on the coastal zone keeps expanding because of human-induced activities as well as relative sea level rise, there is an urgent need to find sustainable solutions for coastal protection.

Continuing coastal erosion worldwide is leading to the development and installation of innovative techniques for effective and unobtrusive shoreline and near shore control. There are increasing examples of replacement or modification of traditional hard rock protection with softer options such as beach nourishment, dune management, and artificial reefs. The investment program is designed to facilitate the transition to softer solutions, with a focus on environmentally appropriate and sustainable solutions.

The benefits of coastal protection to coastal economies are enormous. Interventions to prevent coastal erosion and protect beaches and adjoining land will benefit port operators and users, fishermen, tourism operators, beach users, farmers, and other property owners and local communities living near to and/or depending on coastal ecosystem services and resources. In addition, the introduction and development of new technologies have lower environmental and social impacts than rock walls, which are the traditional solution to coastal erosion problems in India. The introduction of these new technologies for coastal protection leads to solutions that not only protect the coastline from erosion but enhance income-generating opportunities for communities living near the affected areas.

Institutional environment. The mandate for coastal erosion mitigation is typically entrusted to the state level coastal divisions, which is part of a larger state department with a much broader and largely technical mandate. The technical and human-resource capacity of the coastal divisions is limited, with minimal experience in modern and sustainable coastal protection and management measures. Staff are frequently transferred to other unrelated sections / divisions, and untrained persons are posted for short durations. There is no specific permanent institution or training provided for coastal engineering in any State.

Integrated management and the use of environmentally and socially acceptable solutions for coastal protection require effective local level community participation. The processes for these solutions are presently limited and new methodologies will have to be developed to meet these requirements. Maintenance is a key issue; a high level

of local support for maintenance is required in some areas, such as beach stabilization work. Development of protection works could open up opportunities for communities and other stakeholders, with some initial support, to help realize potential financial benefits.

B.2.1. Community Led Protection Measures

Natural protection is a low cost approach which is appropriate for less severe levels of erosion and beach instability. Natural protection is being developed internationally and to some extent in India. In India the main thrust is the establishment of mangrove and shelter-belts, for which there are now a number of projects and programs. Less well researched areas include; integrated climate resilient beach and dune management, beach nourishment in under nourished areas to attain climate resilient profiles, introduction of climate resilience to existing mangrove systems, integrated climate resilient estuarine, delta, inlet, spit and/or barrier island management plans and 'sustainable mangrove development in higher wave energy and erosion zones'.

Natural protection measures form a part of the investment plan for the SCPMIP Karnataka and Maharashtra with an indicative 5% of the total investment directed to the natural protection component.. Natural protection includes mangrove, beach and dune management, shelter-belt, *nalla* (drain) alignment, beach nourishment, beach scraping. The project preparation report for the SCPMIP identifies various options for beach and dune management. Beach management incorporates promoting the development of sand dunes through sand fences and planting. Zoning of the dunes as protection area is required to limit human and animal access and control development to minimize erosion. Additional measures can include beach nourishment, beach scraping (scraping sand from the lower beach to the higher beach/dune area) and *nallah* (drain) training and clearing. An area being supported by the baseline project is the use of geotextile containers as a substitute for rock. Small sand filled geotextile bags of about 1m³ size are appropriate for community use and can be put inside dunes to provide additional protection/stabilization.

Destabilization of the coastal wetlands and mud may occur under climate change. Various methods have been developed internationally to establish mangroves in areas where natural and conventional regeneration is not possible. Community participation is important to ensure long term sustainability including limiting of the cutting of firewood and grazing by livestock.

The SCPMIP projects in Maharashtra and Karnataka include provision for beach management consultants and coastal wetland ecologists who will be examining the potentials for natural protection measures as alternatives to rock and other engineering approaches. These consultants will mobilize during 2012 or early 2013 and would be able to provide guidance on natural protection technologies and strategies which can form the base of the design of the pilot projects.

For community based natural protection programs there is a need to better develop the concepts and to pilot viable and sustainable implementation methods. Effective community engagement and participation is critical together with sourcing of long-term sustainable sources of finance for maintenance. It is proposed that pilot community based natural protection projects in the under the GEF-SCCF financing. Depending on the evaluation of the pilot projects the application of community based pilot projects could be up-scaled in Tranches 2 and 3 of the SCPMIP scheduled for 2014 to 2019. The lessons learnt and performance evaluation of the pilot projects will be extremely valuable.

B.2.2. Vulnerabilities to Climate Change

The baseline project includes only limited scope to address climate change. There remains uncertainty of the climate change impacts but the likelihood is that beaches and mud flats will become increasingly under risk of erosion. Even small increases in vertical sea level rise and wind parameters can potentially have major impacts on the coastal hydrodynamics including horizontal loss of the foreshore and erosion impacts on the land and settlements. Land subject to minor erosion could become sites of major erosion, presently stable beaches and mud flats could become locations of erosion. Stable and productive mangrove could become vulnerable if the mud strata start to erode.

Information from the coastal states indicates that currently about 22% of the Indian coast to be affected by erosion⁸; estimates are that 40% of the Maharashtra and 90% for the Karnataka coastlines respectively suffer from some

⁸ National Coastal Protection Project

degree of erosion. Beaches and mud flats are the natural protection to the coast; their long term sustainability is very sensitive to changes in sea and wind regimes as well as anthropogenic changes. Despite significant investments in rock protection most of the coast remains sensitive and potentially unstable; small changes in the regimes of natural sand supply and the coastal hydrodynamics can trigger major changes in the equilibrium of the beaches and mud flats and increased degradation of the rock protection. Small changes in sea level and wind parameters

Beach erosion is the physical movement of sediment away from the shore via wave and current action. Sea level rise has the capacity to exacerbate erosion by promoting offshore transport of sediment. The best-known and most widely applied modeling of this process is offered by Bruun (1962). The 'Bruun Rule' suggests that shoreline recession is in the range of 50 to 200 times the rise in relative sea level; this recession is caused by a beach's desire to maintain an equilibrium profile. To maintain the equilibrium profile in the presence of sea level rise, sediment is removed from the shoreline, which causes the erosion. Sand is subsequently deposited offshore so that the near-shore zone gains elevation at a rate equal to the rise in sea level. As sea level rises, the beach profile adjusts by shifting landwards and upwards by removing sediment from the shoreline and depositing it in the nearshore zone. The volumes of eroded and deposited material are equal. Increased sea levels of about 150mm over the last 20 years may well be contributing to some of beach instabilities found on many of the Indian beaches. Long-term instabilities of the beaches which comprise 43% of the India coast are considered one of the main areas of vulnerability from climate change. Low cost and environmentally appropriate methods of protection need to be developed and implemented; these may not in themselves provide full protection but may be able to slow the rates of erosion. The very high costs of fully engineered protection may not be economically viable and partial protection and support for some level of retreat maybe required. Changes in the predominant wave directions resulting from climate change may have significant effect on the long term equilibrium of beaches.

Migrating Inlets: All along the Indian coast the migrating river mouths have resulted in long shore parallel spits which are estimated to be especially vulnerable to increased sea level, wave energies and river flood flows. Breaching of the spits can result in major shift in the location of the inlet with potentially major impacts to existing investments and navigable access to the river mouths. Deltas are also potential areas of higher impacts of climate change.

Mud Flats and Mangroves: sea level rise and increased wave action will affect mangroves which form the main natural protection where the correct salinities exist. Although the mangrove is tolerant to changes in sea levels and salinities it is likely that mangrove will be most vulnerable at the margins, especially in areas of high energy erosion prone shorelines including areas of revetment where sediment removal and natural recruitment no longer occurs and where conventional planting methods become ineffective. Changes in the coastal hydrodynamics from sea level rise or changes in predominant wave direction can potentially cause shifts in the mudflats with potentially significant loss of mangrove in affected areas.

B.3. Description of the Incremental Value of the GEF-SCCF Activities

B.3.1. Introduction

The GEF-SCCF grant will support mainstreaming of climate change resilience into coastal protection and shoreline management. The GEF-SCCF grant support will be carefully targeted and will build on and develop complementary actions to the baseline SCPMIP project with special attention to the vulnerabilities of the coastal communities and the development of low cost, community based economically viable and sustainable adaptation responses to develop a range of mechanisms to:

- (i). Provide a clear analysis and interpretation of potential impacts of climate change and development of guidelines for appropriate adaptation interventions which can be applied to support the development of national-level processes and mechanisms to integrate climate change adaptation into shoreline management planning--including guidelines, and methodologies--to ensure and support climate resilient development and avoid potentially risky investments along the coast;
- (ii). At the operational level, implement climate-proofing of the coastal investments incorporating state of the art climate science, impacts and vulnerability assessments in the two focal states of Karnataka and Maharashtra. Vulnerability assessments will be carried out through; (i) detailed assessment of specific case studies to analyse and assess vulnerabilities of typical coastal scenarios, these would include the tranche 2

sub projects, the pilot community project and other selected project (ii) applying the analysis of case studies and typical coastal scenarios to prepare climate vulnerability assessments for the shoreline management plans in the two focal states.

- (iii). The systematic development and strengthening of technical and institutional capacities to plan, implement and maintain policies and operations that integrate climate resilience within sustainable coastal protection and shoreline management.

A definitive analysis and interpretation of potential impacts of climate change is required to support the baseline project. Without supporting climate change studies the construction of coastal protection infrastructure and shoreline management planning will proceed largely according to the current standards that do not explicitly consider climate change related risks and vulnerabilities. Without clear and officially endorsed design guidelines planners and designers have neither the knowledge base, nor the mandate to design for potential impact scenarios under climate change. As a result investments will be less 'resilient' than they need to be, given the potential impacts of climate change. The SCCF funding will enable climate change parameters to be factored into planning and design and allow a significant number of coastal protection infrastructure investments under the SCPMIP to be climate proofed; meaning the design will consider risks arising from climate change alongside other drivers of coastal change. The process of climate-proofing will build on experience and develop lessons and policy recommendations for the modification of coastal protection regulations and standards at state and national levels. Related analytical and spatial planning capacities will also be developed in the pilot States and at the national level.

The GEF-SCCF support will also create indirect benefits on similar coastal protection infrastructure investments in India's coastal regions, starting with the west coast states of Karnataka and Maharashtra, but laying a foundation to upscale the approaches to other coastal states. Under the SCPMIP some basic site based climate change vulnerability assessments and integration of climate resilience factors and design into investments for selected sub-project pilot sites have been undertaken during Tranche 1 of the investment program. The objective is to develop more scientific and rigorous approaches to mainstream this process for all SCPMIP Sub Project Sites (during Tranche 2 and 3). The overall outcome from this GEF-SCCF funding will be greater climate resilience of for the two focal states of Karnataka and Maharashtra together with the development of guidelines and training of trainers which, will be of benefit all other coastal areas of India.

A core element of the combined baseline together with GEF-SCCF project support will be to examine climate change related risks through participative dialogue with local communities and district /*panchayat* level officials. By linking the scientific analysis of climate change impacts with the information at the district and community level will allow the development of integrated guidelines and approaches to support climate-proofing reduction of vulnerability reduction at all levels. The objective will be to develop and support the use of low cost community based natural protection measures through cost-effective, environmentally sustainable approaches. The community approaches will be implemented through pilot community protection projects and provision of finance for conservation and the use of soft infrastructures and natural protection measures together with the promotion of livelihood development including increased participation of women.

The soft community project approach will not be appropriate nor will it be a sufficient solution to all coastal erosion issues and parallel interventions. Using more intensive investment engineering type solutions will still be required for more serious erosion problems. Maintaining the environmental integrity and sustainability of the shoreline will remain a key objective for all protection measures.

Dissemination of relevant adaptation knowledge through national knowledge-sharing networks will be a key objective. This will be undertaken in the context of ongoing efforts in mainstreaming climate change adaptation policy, coastal infrastructure development, and capacity building on efforts by ADB and other development partners in India. By aligning lessons learned from local level investments with national level programs, related to coastal zone management and climate change adaptation initiatives, this proposed project will catalyze climate resilient development in vulnerable sectors and regions in the two target states.

Furthermore, the GEF-SCCF project will promote awareness and strengthen the technical capacity within key sector agencies and professional groups with coastal protection and shoreline planning responsibilities to promote climate-resilient decisions at national and local planning levels. Through this, information on the vulnerability of coastal areas to climate change will be fed into coastal planning processes so that options for coastal development can be assessed and recommendations made regarding changes in the planning or zoning of coastal areas or provision of resilience strengthening measures to reduce risks to existing or planned infrastructure. This may possibly include the identification of areas that are not recommended for certain types of development, as well as

guidance/recommendations for climate resilient development standards.

This will involve engagement with the Government of India (GoI) at national level as well as at the State and local levels and with the private sector, NGOs and community groups. Institutional strengthening within the GoI will focus on the MoWR and its subsidiary bodies while promoting cross-sector linkages between GoI agencies at all levels, the private sector, NGOs and community groups. Through the GEF-SCCF supported activities, the Ministry of Environment and Forests (MoEF), which is the central authority for regulating and controlling the activities in the coastal zone of the country, will be increasingly involved in the project as well as various national level bodies such as the National Coastal Zone Management Authority (NCZMA), State / Union Territory Coastal Zone Management Authorities (SCZMA), Central and State Pollution Control Boards and other State level agencies. During the project implementation, further stakeholder consultations will be undertaken to refine institutional arrangements and the project's design..

B.3.2. Design Parameters for the GEF-SCCF Project

From consultations with state and central government stakeholders, it was agreed that the GEF-SCCF project should be developed to address key coastal management and protection priorities, as listed in **Table 5** (below).

Table 5. Key Parameters for the GEF-SCCF Support

<i>Link and complement ongoing programs</i>	Should link and complement overall strategies for coastal protection and management. Four key linkages have been identified <ul style="list-style-type: none"> • The SCPMIP in Karnataka and Maharashtra • The MoEF CZM Program at national level and also in Gujarat, Orissa and Tamil Nadu. • The State Action Plans for Climate Change (SAPCC) with special reference to coastal planning for maritime states. • Ongoing research by relevant Indian Research Institutes
<i>Avoid duplication, additionalities and fill gaps</i>	Should not duplicate but complement ongoing initiatives and should establish additionalities and fill the gaps
<i>Address key areas of vulnerability</i>	Should address key areas of vulnerability under climate change in the two focal states but also provide benefits to the other coastal states in the form of appropriate guidance and enhanced awareness.
<i>Both current and future needs</i>	Should incorporate current needs as well as requirements for climate change adaptation.
<i>Innovative and value added</i>	The GEF-SCCF supported initiatives should be innovative and add value to ongoing initiatives and programs.
<i>Sustainability</i>	Designs should be incorporate sufficient factors of safety to meet projected climate impacts together with a greater emphasis on maintenance to rectify damage.
<i>Participatory and Consultative Design Mechanisms</i>	The design of the GEF program should be participatory and consultative with relevant stakeholders
<i>Clear well defined outputs</i>	The project should have clear outputs that can be measured, verified and monitored.
<i>GEF project to include physical investment</i>	Based on the GEF Project Identification Form and consultations with relevant stakeholders, it was agreed that some physical investment aiming at piloting specific innovations should be included in the GEF-SCCF project. Projects should be easily implementable within a six month period

B3.3. Information Needs for Coastal Climate Change Adaptation

There are many publications on the Indian coasts; however a review of the available literature shows that there are only a very few studies directly related to climate change, its resultant impacts on the coastal zone or specific guidelines for adaptation The GEF-SCCF grant is designed to review ongoing research contributions that can be used as a foundation for estimating the impact and identifying the gaps in information to decide future lines of action. Most studies have listed broad areas of impact however few have been able to produce quantified predictions of impacts due to the scientific uncertainties involved in making such predictions. Climatic change impacts in coastal areas will be both diverse and extensive including alterations to physical, biological and human elements. More detailed understanding of the functioning of coastal systems is required to facilitate the impact prediction, planning and management. There is a need for a coordinated and multidisciplinary approach to impact assessment rather than a narrow sectoral approach. Potential impacts may be directly related to temperature and

other components of climate. The primary effects on the coast include the effects from:

- (i). Sea level rise due to thermal expansion of sea water, melting of glaciers and ice caps and over exploitation of groundwater
- (ii). Changes in wave parameters including size and direction due to climatic changes of winds as well as increases in wave heights from sea level rise. Equilibrium and stability of beaches is very sensitive to changes of predominant wave directions.
- (iii). Changes in frequency and intensities of storms and storm surges
- (iv). Vertical land movements-vertical land movements from isostatic (changes in the earth's crust) adjustment and localized land settlement from groundwater abstraction, urban development
- (v). Changes in freshwater flow regimes including flood flows will have effects in the estuaries; salinity in estuaries is influenced by the seawater level as well as the freshwater flows regimes.

The Government of India has coordinated a number of assessments of climate change projections, impacts and mitigations at the national level including; Climate Change studies supported by Asian Development Bank. Asian Least-Cost Greenhouse Gas Abatement Study (ALGAS) supported by Global Environment Facility (GEF); Climate impact assessment study under the Indo-UK collaborative project and the National Communications supported again by GEF. The recent assessment by National Communications project involving 131 teams across various disciplines has covered all the three aspects: climate projections, impacts, adaptation and mitigation. Based on all these assessments, India has recently prepared the National Action Plan on climate change.

A Centre for Climate Change Research (CCCR) has been established at Indian Institute of Tropical Meteorology, Pune by the Ministry of Earth Sciences. This Centre has the capability to analyze the rainfall trends for the future. The Centre for Atmospheric Sciences at IIT, Delhi has been working in the area of cyclones and storm surges. The National Institute of Oceanography (NIO) has observed significant gaps in the understanding of land level changes in relation to sea level rise and has identified this as one of the main areas of research. The geoscientific data on the stability of landmasses are handled by the Geological Survey of India; NIO has a geological section which has some involvement in land mass changes. The projections of SLR at different stations are also being examined. The design modifications required for the coastal protection measures would be in the domain of the activities of the Central Water and Power Research Station (CWPRS) which falls under the Ministry of Water Resources. The National Institute of Ocean technology working under the Ministry of Earth Sciences has also developed some capacity in the area of coastal engineering.

B.3.4. Current Gaps in Climate Change Adaptation for the India Coastline.

There are many current gaps in climate change analysis and adaptation for the India Coast. The main identified areas include:

- (i).Lack of Integrated Analysis of Climate Change Trends and Projections for the Indian coast: Although there are various state and central government initiatives to assess the coastal climate change impacts there is a need to undertake a comprehensive analysis for the Indian coast. There is a need to build and develop work being implemented by key Indian research institutions, such as IITMs, NIO, MoES, MoEF, DST as well as sourcing the latest international climate research to analyze and compile best possible projections for climate impacts for the Indian coastline including assessment of uncertainties.
- (ii).Lack of planning and design criteria and guidelines to support coastal protection and management decision making. Coastal planners and designers have limited understanding of how to incorporate climate change into coastal protection and management activities.
- (iii).Lack of an integrated coastal information system; there is very limited access to coastal information. Open access to coastal climate change information is critical for sustainable coastal management. The information system should incorporate the impacts of climate change.
- (iv).Issues of uptake and mainstreaming of coastal climate change adaptation needs to move climate change analysis and guidelines forward to actions on the ground. The SCPMIP investments in Karnataka and Maharashtra are required to incorporate climate change into planning and design but the resources are insufficient for a comprehensive analysis.
- (v).Greatest vulnerability from climate change appears to relate to increased instabilities of the beaches, dunes and coastal and estuarine mud flats, these form the natural protection which if becomes unstable could potentially lead to widespread damage. A part of the SCPMIP is directed to the development and strengthening of the natural coastal protection measures including beach and dune management, mangrove

and coastal planting, and beach nourishment. There is a need to better understand sustainable approaches and effective community involvement.

(vi). There is limited capacity in coastal protection management and especially climate impacts. Sustainability of new initiatives needs to be supported through strengthening of institutional capacities and enhanced awareness. The SCPMIP training component is designed to support training in the two focal states.

B.3.5. GEF-SCCF Project Proposal

Four components are proposed for the GEF-SCCF project. Components two, three and four link to the three components of the baseline project; component 1 is a new additional component. The project proposal is summarized below.

<p>Component 1: Analysis of Climate Change Impacts in Coastal Areas and Preparation of Guidelines for Climate Change Adaptation for the Indian coast.</p>
<p>1.1 Analysis and interpretation of climate change trends and projections for the whole Indian coast.</p> <p>This component will build on and develop ongoing work being implemented by the key Indian research institutes as well as sourcing latest international climate research including the IPCC Fifth Assessment Report (scheduled to be issued in 2013). The studies will incorporate analyses and interpretation to derive the best possible estimates of climate impacts for the Indian coastline including assessment of uncertainties.</p> <p>An in depth analysis and assessment of national and international research findings will be undertaken through international and national specialist consultants working with and building on ongoing work in three focal Indian research institutes; the focus of the analysis will include:</p> <ul style="list-style-type: none"> (i). Historic trends in sea levels (ii). Projections of sea level rise from climate change (iii). Analysis of Vertical Land Movements (iv). Downscaled climate change projections of temperature, wind and rainfall (v). Analysis of changes in wave characteristics from climate change (vi). Analysis of projected changes in storm surges
<p>1.2 Preparation of planning and design criteria and guidelines for coastal climate change adaptation</p> <p>Planning and design criteria and guidelines to support coastal protection and infrastructure decision making will be developed. These will be based on analysis of the various climate change assessments and defining the impacts and vulnerabilities of various coastal sectors under climate change. Scientific, engineering and economic analysis of the impacts and appropriate design criteria for climate change resilience will be developed. Close consultation will be kept with CWPRS at all stages.</p> <p>Case studies from the two SCPMIP focal states together other programs including the MoEF CZM project would be analyzed to assess the levels of vulnerability of different coastal situations to climate change.. The case studies will be analyzed to develop the most appropriate approach to incorporation of climate resilience; including cost benefit analyses of different adaptation approaches; possible scenarios would include, do nothing, immediate and deferred adaptation. The outputs of the case studies will be applied to develop adaptation criteria and guidelines applicable to all coastal states. Adaptation criteria would be compliant with official notifications of the coastal resilience zone. The climate change impacts, adaptation criteria and guidelines will be reviewed by an advisory panel of experts nominated by each coastal state and union territory; the panel will provide a wide range of expertise with a good geographical spread of knowledge of the different conditions of the Indian coastal states. The outputs of the peer reviews will analyzed and synthesized into the final version of the guidelines. The final guidelines will be submitted to the National Technical Committee who will provide the formal government endorsement</p>
<p>1.3 Coastal climate change parameters are incorporated into information systems being developed by central agencies.</p> <p>The GEF-SCCF grant will provide support to incorporate climate change parameters into the</p>

coastal information systems being developed by central agencies including the coastal information system being established by MoWR and the systems being developed by the MoEF ICZM project. The objective will be to ensure the 'coastal climate change information package' has compatibility and can link with key Indian coastal information systems including the SCPMIP, the National Coastal Information System and the MoEF information systems.

The project will prepare specific guidelines for the 'coastal climate change information package' which can be taken up by the coastal information systems being developed by other central agencies and coastal states.

GEF-SCCF Component 1 Value Added: The consultants will develop adaptation guidelines by interpreting the work of various international and national institutes. Through a broad spectrum of resources it will be possible to develop the best possible state of the art information on climate change impacts and projections and recommendations pertaining to the most appropriate adaptation response. Peer review and official endorsement of the findings by a panel of experts will provide an appropriate basis for adoption of the guidelines by state and national level agencies and institutions including designers of SCPMIP supported interventions. The project will facilitate and provide an appropriate basis for upscaling and mainstreaming of the SCPMIP information systems in the two focal states.

Component 2: Climate Resilient Shoreline Planning and Management in Two Focal States

Component 2 will provide additional expertise to support the SCPMIP to incorporate climate change adaptation measures, including:

- (i). Provision of simple assessments of coastal vulnerabilities to climate change based on reference to case studies in the adaptation guidelines.
- (ii). Incorporation of climate change resilience and adaptation measures into the preparation of the shoreline management plans.
- (iii). Shoreline plans including climate resilience must comply with notifications of the coastal resilience zones.
- (iv). Coastal information system in two focal states incorporate climate change parameters.
- (v). Provision of additional expertise to support the SCPMIP designers incorporate appropriate measures for climate change resilience for the Tranche 2 designs.
- (vi). Based on the 'climate adaptation guidelines' conduct analyses of potential climate change impacts and prepare specific recommendations for climate resilience for the short list of possible Tranche 3 sub projects. The SCPMIP designers would be able to refer to the adaptation guidelines and the specific recommendations for climate resilience.
- (vii). Economic assessments, including benefit-cost analysis, of different adaptation scenarios and design decisions will be undertaken and applied in the sub project designs.
- (viii). Case studies from real issues in the SCPMIP states will be incorporated into the adaptation guidelines.
- (ix). The GEF-SCCF grant would support the detailed planning and design of up to six pilot community natural protection projects at selected locations in Karnataka and Maharashtra. Pilot locations will be selected based on the shoreline management plans.
- (x). Planning and design of pilot projects will incorporate community participation to ensure viabilities and sustainabilities including approaches protect community livelihoods from climate change impact and support employment of women and marginal groups in the planting and maintenance activities.

GEF-SCCF Component 2 Value Added will provide climate resilient project planning and designs based on the climate studies and analyses. Case studies from the focal states including outputs and lessons learnt from the community pilot projects will be used to support the adaptation guidelines.

Component 3: Climate Resilient Coastal Investments in Two Focal States

Component 3 will be directed at reducing coastal erosion and instabilities through focused economically viable coastal protection investments. Investments for coastal protection and management sub-projects would be funded through the co-financing from the ADB SCPMIP loan for Karnataka and Maharashtra.

The GEF-SCCF would directly support the implementation of small pilot community natural protection projects. These would be demonstration projects to be implemented during 2014. The pilot projects would be natural protection projects focusing on beach and dune management based on community based coastal management. There is limited experience of this type of approach in India and limited experience in community led coastal management and protection interventions. The pilot projects are proposed to test and demonstrate approaches including; support for community awareness, the application of zoning of dunes, fencing, planting and protection of dunes, use of small geotextile bags inside the dunes for additional protection, training and maintaining the openings of small river outlets and development of strategies for retreat where full protection measures are not viable. The design of sustainable approaches to community based management will form a key part of the pilot projects. The GEF-SCCF finance will support up to six communities based pilot natural protection projects in the two focal states to demonstrate and test new initiatives.

The locations and preliminary approaches of the community based natural protection would be supported by the SCPMIP through the shoreline planning activities and their specialist natural protection consultants. Close coordination would be maintained with community stakeholders and district Government officials. The GEF-SCCF would prepare the planning, detailed design and cover the investment costs for the pilot projects.

The community protection projects will be implemented as community driven initiatives. This will require training and awareness of the issues and supporting the effective engagement of community organizations in shoreline management including the establishment of shoreline management organizations (SMO). The approaches to community engagement would be tried and assessed under the GEF-SCCF project. The SCPMIP baseline project would be able to support upscaling of community projects in Tranche 2 and 3 of the loan incorporating lessons learnt from the pilot projects.

GEF-SCCF Component 3 Value Added: The adoption of climate adaptation guidelines would facilitate incorporation of climate resilience in the design and implementation of subprojects. The GEF-SCCF consultants will directly interact with the SCPMIP project for the Tranche 2 investments. For Tranche 3 sub projects the 'adaptation guidelines' will be prepared and endorsed and the GEF-SCCF consultants who will prepare recommendations for climate resilience for the short list of possible projects.

In general, there is a lack of long term monitoring in India and only limited evaluation of natural protection measures. The long-term sustainability of natural protection projects is critical and effective models for community engagement and ensuring long term funding mechanisms need to be identified. The GEF-SCCF support up to six pilot projects which will allow the testing of new approaches and the development of appropriate models for community engagement and developing mechanisms for long term maintenance and management. Upscaling of community led natural protection projects will be undertaken under tranche 2 and 3 of SCPMIP.

Component 4: Institutional Strengthening, Capacity Building and Enhanced Awareness for Climate Resilient Coastal Protection and Management.

Component 4 will develop training based on the adaptation guidelines within the two focal states and nationally. The GEF-SCCF funds would provide specific support to:

- (i). Incorporate of climate change adaptation responses into the training programmes. The National Water Academy in Pune working with the CWPRS would form the training hub.
- (ii). Training of 25 trainers in the application of climate change guidelines including the coastal climate change information package. The objective would be to develop a cadre of experienced trainers with understanding of climate impacts and measures for adaptation. The cadre of trainers to be trained will be from various disciplines and different institutes including the National Water Academy, NIO, CWPRS, and selected state institutes. The training will be provided by the implementation consultants together with resource person from the three focal institutes and other organisations.

- (iii). Provide training courses for senior level staff and decision makers from the central agencies and maritime state officials and stakeholders. Training will be by the cadre of trainers and other resource persons. Incorporate climate change adaptation into the training programs in the two focal states.
 - (iv). Provide dissemination of information for enhanced awareness of stakeholders and strengthening of international knowledge networks in climate change adaptation for coastal areas.
- GEF-SCCF Component 4 Value Added** would include the incorporation climate change and climate change adaptation into the SCPMIP training. The GEF-SCCF fund would allow training activities to be widened outside the focal states including training of trainers and some provision of training for national level institutions, central government and other maritime states. The national water academy would be the established as a training hub for coastal climate change adaptation.

The cost estimate for the proposed GEF-SCCF project budget is shown in **Table 6** below.

Table 6 Cost Estimates for the GEF-SCCF Project

Item	Amount US \$
Financing by the Special Climate Change Fund^a	
1. Consultants ^b	
a. Remuneration and Per Diem	
i. International Consultants (22pm)	550,000
ii. National Consultants (44 pm)	260,000
iii. Advisory Panel of National Experts ^c (8pm)	56,000
2International and Local travel	70,000
3. Studies by Focal Research Institutes ^d	180,000
4. Data, Surveys, Studies and GIS ^e	20,000
5. Reports and communications	15,000
6. Misc office equipment ^f	5,000
7. Training, demonstrations, workshops and awareness materials	
a. Training of trainers, senior level training	52,000
b. Implementation of Pilot Community Protection Demonstration Projects including community awareness, participation and coordination ^g	400,000
c. Production of awareness materials	10,000
d. Workshops and consultations	20,000
8. Project management, administration and support costs	65,000
9. Project monitoring and evaluation	10,000
10. Contingencies	105,182
Total Cost of the TA	1,818,182
GEF-SCCF Agency Fee ^h	181,818
Total ^h	2,000,000

Support in Kind by Government

Provision of co-financing through the baseline project-Tranche 1: \$54million
Total MFF for Tranches 1, 2 and 3: \$ 404 million.
Provision of small office space at CWPRS Pune
Occasional office space in SCPMIP offices in Mangalore and Mumbai
Coordination and liaison support for pilot community projects in two focal states
Constitution of National Technical Committee
Support to officially endorse the climate change adaptation guidelines

^a Administered by the Asian Development Bank

^b Experts to be engaged through an International Consulting Firm

^c Advisory Panel of Experts would be nominated by MOWR and maritime states and approved by ADB to provide peer review climate analyses and adaptation guidelines. It is proposed that one expert or institute from each maritime state and

Union/Island Territory and 4 national experts are engaged. The consulting firm would be responsible for the remuneration of the panel.

^d Focal research institutes would be sub-contracted by the consulting firm to undertake specific analyses of climate change impacts and support the preparation of guidelines.

^e Other studies and preparation of GIS to be commissioned as required.

^f Procurement of 2 computers, projector, printer and scanner equipment to be given to the National Implementing Agency at the end of the project.

^g Grants for up to six village level community pilot projects including; awareness, training, demarcation of dunes, planting, sand fencing, access paths, beach scraping, river mouth training, small sand filled geotextile bags. Includes the engagement of local community coordinators/ supervisors. About 6 locations in the two focal states, with about 3km of natural protection per project. Projects to be managed and paid through the consulting firm.

^h GEF-SCCF administration cost which will be withheld by the GEF are 10% or \$181,818.

B.3.6. Pilot Community Projects

Selection Criteria: The objective of the pilot community projects will be to develop and test methodologies and approaches to community led protection measures for coastal protection and management incorporating climate change adaptation measures. The pilot protection projects will focus on community based beach and dune management and will test and demonstrate appropriate approaches for India including mechanisms to effectively involve and engage the communities in shoreline protection and management.

The pilot projects will be implemented in close coordination with the SCPMIP. Candidate sites will be identified through the SCPMIP shoreline planning processes with selection of sites endorsed by the project PMU and the project steering committee and agreed to with the target communities. Vulnerabilities to climate change will be assessed through the application of the climate change adaptation guidelines and outputs from case studies into the shoreline management planning activities in the two coastal states. Close reference will be made to the MoEF/World Bank Coastal Management Project which is currently defining the coastal zone hazard line for the whole Indian Coast. Sites for the pilot projects should meet the following criteria.

- (i). The proposed sites including the community assets exhibit some degree of vulnerability to erosion or have shoreline management issues that might be exacerbated by climate change impacts.
- (ii). The sites should not suffer from severe erosion problems requiring specialist analysis, planning and design.
- (iii). Demonstrated willingness of the communities to participate in the design and implementation of the pilot interventions and to support long term maintenance and management of the projects.
- (iv). To have no requirement for land acquisition or resettlement.
- (v). Demonstrated potential for sustainability, including access to sources of finance, labour and other requirements after the project completion.
- (vi). Technical appropriateness, financial viability and demonstrated potential for strengthening the resilience of coastal ecosystems and communities to the adverse impacts of climate change and climate vulnerability through innovative solutions.
- (vii). Existence of registered local community organizations such as Shoreline Management Organisations (SMOs) or equivalent community based organisations with a functional institutional structure to support the project objectives.
- (viii). Demonstrated potential for replication and scaling up.
- (ix). Potential for an appropriate role for women and women-headed households in the design and implementation of pilot projects.
- (x). Priority for interventions that can support the livelihoods of low income groups
- (xi). Relatively compact and locally manageable activities that can be implemented in a six month period
- (xii). Must be able to show results within the period of the GEF-SCCF project. The interventions shall be consistent with the provisions contained in the CRZ.

Selection Process: The selection process for the pilot community projects would follow the same process of sub-project selection under the baseline projects. The initial selection of the potential community project sites would be initially based on the shoreline management planning activities including the incorporation of climate change parameters and vulnerability assessments. It is proposed that a short list of about 30 potential sites are taken up for a second stage of evaluation and screening according to the parameters described above. The short list would be presented to the project steering committee in the two states and final selection made by the committee.

Scope of Activities: The proposed community pilot project will focus on natural coastal protection measures focusing on dune and beach management, nalla (drain) alignment, beach nourishment, beach scraping, sand fences and planting technically appropriate species that result in beach and dune stabilization and enhance resilience to climate change and climate vulnerability. In points of more severe erosion the communities could be supplied with non woven geotextile bags with about 1.0-1.5m³ capacity; bags would be filled with sand, stitched and placed by the community members themselves. Some protection of the bags would be provided by building in parallel the dune systems; the dunes may periodically be washed out but the bags would be able to provide an additional level of protection.

The interventions should provide enhanced opportunities for income generation and livelihoods that would result in improved quality of life of people living in areas most affected by climate variability and climate change. Emphasis should be given to the role of women and to encourage women's participation in planning and implementation.

The pilot community projects would include the following activities:

- (i). Participatory rural appraisals backed by technical appraisals to identify issues and community perceptions on protection options
- (ii). Meetings and consultation at district/panchayat and community levels to brief and create awareness
- (iii). Simple site surveys of selected beach areas to define different land uses,
- (iv). Participatory design of the program
- (v). Training in planting methods, filling placing and stitching of small geotextile bags
- (vi). Provision of appropriate plants, small geotextile bags,
- (vii). The design of the pilot projects would include demarcation of the dunes and other vulnerable areas using wooden pegs, details of the agreed beach protection and management activities, agreement on the mechanisms for funding including funding for long term maintenance activities.

B.4 Description of the Socioeconomic Benefits

B.4.1. The Baseline Project

The coastal zone forms a key part of the economy in the Indian maritime states. Rural and urban communities are affected by coastal erosion and issues relating to poor coastal management. The main direct financial and economic impacts of the SCPMIP will be the protection of land, buildings and infrastructure from future damage caused by coastal erosion and monsoon storms. The benefits of the protected land will indirectly benefit the incomes and livelihoods of both urban and rural households and businesses located on the coastline. Tourism, farming and fishing households, ports and industries and their owners, operators and workers will benefit from the subprojects. Removal of erosion risk will be a major initiative to encourage future investment in the coastal zone.

In addition to land protection, the project will support the long term sustainability of the beaches which form the natural buffer to coastal erosion. Previous protection programs largely based on rock revetments have neglected the intrinsic value of the beaches and in many cases have been a direct cause of increased degradation of the beaches.

Use of new approaches and soft environmentally sensitive protection measures proposed under the SCPMIP are designed to sustain and enhance the beach areas. The beaches are essential for artisanal fishermen to land their boats, provide areas for fish drying and fish processing and form key contributors to the economies in the tourist areas. The tourism potential of much of the coastal area is very high and the long term economic and environmental benefits of sustaining the beaches through the project interventions will be very significant. The GEF-SCCF support will implement community level pilot natural protection projects which will support the development of community engagement and participation in the shoreline protection and management with the objective of securing the long term sustainability of employment opportunities. The coastal zone does and will continue to offer many opportunities for economic development and for the improvement of the livelihood gaps of disadvantaged groups; it also requires initiatives to preserve the environment and address issues of shoreline degradation.

The project will effect significant changes in philosophy and approach to coastal protection and management; it will build capacities and ensure a well planned and programmed transition process from hard environmentally inappropriate protection works to a new approach of participatory planning and integrated development of environmentally appropriate and sustainable solutions. In addition the project will ensure the planning and designs for the proposed investment

program meet the highest standard of environmentally and socially appropriate solutions; the program will include major initiatives to ensure the generation and dissemination of information and knowledge products.

The use of soft technologies can provide both land protection as well as improved and expanded beaches. Both of these have the potential to improve the livelihoods of the shoreline communities. The protection will allow scope for investment of the landside and the stabilized foreshore opens up opportunities including tourism, fishing boat landing, shore fishing, fish processing, etc. There is shown at the sub-project sites in developing community tourism, fish processing, local trading, etc. This component is designed to support communities to promote income generation and improved livelihoods, particularly for poor rural communities; possible areas include finance for small and micro enterprises, minor infrastructure to help improve the value of the shoreline (access, roads, lights etc), and development of a CEPA (communication, education, participation and awareness) programs.

Although there are generally no people directly living on the beach areas there are however a number of marginal groups including women residing or working in the vicinity of the shoreline. The SCPMIP baseline includes budget provision amounting to \$3.6 million for appropriate and viable community development initiatives to be targeted towards these groups to enable them to maximize the opportunities created by the coastal protection and management investments. Employment opportunities will also be created as part of the project construction and maintenance activities, and with proper training individuals from poor communities can entry into formal employment through these activities. Where appropriate some part of the income generation proceeds could be used for funding support for shoreline maintenance.

Women are employed in a number of activities related to the coastal economy. Studies during the SCPMIP project preparation indicated the main activities of women were in fish processing, including fish drying and as vendors in tourist areas. The project objectives of land protection and improving the beaches will be of benefit to artisanal fishermen and promote tourism and related livelihoods. The community based natural protection projects will provide employment opportunities for unskilled labor; tending of plants and maintaining the beach area will require creation of labor pools that will be trained and can take on long term responsibilities for managing the shoreline.

B.5 Potential Risks of not Achieving the Objectives and Measures to Address Risks

There is a range of risks that might limit the project's success in achieving its objectives, which would be mitigated by ensuring close coordination with the four executing partners. The areas of medium risk and proposed mitigation measures have been identified and summarized in **Table 7** below.

Table 7 Risks of Not Achieving Objectives and Measures to Address Risks

Nr	Aspect	Mitigation Measures
1	Difficulties of liaison and coordination at different levels (medium risk)	The proposed project will build on the coordination mechanisms being established under the ADB SCPMIP to ensure key information is shared and collaborative decision-making is carried out. The project will be under the direction of central government through MoWR and the IAs are CWPRS and the project directors of the SCPMIP in the two focal states. This arrangement will support the linkages between the focal states and central government. Close linkage between the World Bank ICZM Project, executed through MoEF will be maintained.
2.	There may be limited readiness and/or ability of central and state ministries to include project outputs in revised official ordinance/regulations (medium risk).	The project will (i) prepare guidelines in close cooperation with relevant agencies and research institutes to promote ownership; (ii) articulate, the financial, social, and environmental benefits to relevant agencies; (iii) ensure that guidance for mainstreaming climate change within coastal planning and investment projects are simple and cost effective; (v) to engage an advisory panel to review the guidelines; and (vi) establish a high level technical committee to review and endorse the project findings
3.	There may be implementation delays: Lengthy procedures in project, procurement and financing delays can all pose serious risk to the project implementation schedule (high risk)	The baseline project started in January 2012 and with the proposed GEF-SCCF project programmed for to start in mid 2013 means the GEF-SCCF support are in line with the baseline project. Tranche 2 designs are programmed for 2013/2014. Significant delays in the GEF-SCCF project may result in Tranche 2 design being completed prior to the mobilisation of the GEF consultants. If this were to occur then some design adjustments may be some limited scope to adjust the designs prior to implementation.

4.	Inappropriate solutions may be proposed. Change to soft environmentally appropriate options may not always be perceived as acceptable (low to medium risk)	To ensure that all physical investments are environmentally and socially appropriate it is a requirement of the ADB baseline project that sub-projects for funding are supported by environmental and social assessments.
5.	Sustainability: will require resources, capacities and organizations for management and maintenance of completed works (medium risk)	Local level capacities, funding and organizations require to be established to support this work. A key objective of the pilot community protection projects is to work with the communities working with local government build up capacities and resources to meet the needs of sustainability.
6.	Risks that moderate climatic conditions, with lower storm frequency and intensity could weaken the resolve of government and communities to take climate resiliences actions (medium risk)	This is an inherent risk of climate change adaptation. Recent history and present evidence of extreme weather events are not quickly forgotten. Provision of training and awareness is an important output of the project. A key objective of the project is to ensure official endorsement of the guidelines which form the basis that climate proofing becomes an obligatory part of coastal planning and design.
7	Risks that the community based adaptation measures implemented with project support do not generate sufficient or demonstrable benefits during the life of the project to persuade communities and governments to invest in these (medium risk)	Training and awareness will be provided to help understanding of the climate processes and cycles of climate and scenarios for climate change. Discussions with coastal communities indicate the level of awareness and understanding of vulnerabilities from the sea is quite high.

B.6. Key Stakeholders involved in the Project

The coastal zone involves many different types stakeholders as summarized in Table 8 below.

TABLE 8 SUMMARY OF STAKEHOLDERS

Aspect	Stakeholder Organization	Stakeholder Interest	Outputs of the GEF-SCCF Project and linkages to stakeholder requirements
1. Coastal Infrastructure			
Coastal Protection Works	State Ports-Harbor/Departments Public Works. MOWR/CWC	Planning design of erosion control works.	Incorporation of climate resilience into planning and design of protection works
Ports Harbors Marinas	Dept Fisheries, State and National Ports and private developers	Design, construction and management of ports and harbors	Incorporation of climate resilience into planning and design of new harbors, strengthening of existing harbors.
Estuary Saline Reclamation (Khar lands)	State Water Resources Department	Management of coastal bunds and control gates.	Incorporation of climate resilience into design of bunds and sluices. Changes in design of drainage to accommodate changes in rain intensities and storm frequency
Boat/ship building	Mainly private sector	Shipbuilding and repairs. Small and large scale	Design of slipways, wharves to incorporate climate change impacts..
Village and urban properties	Property owners	Protection from wave and storms. Flood protection in estuaries and tidal river systems	Improved guidelines to support planning and zoning of housing and estimates of coastal vulnerabilities. Guidelines for flood management planning in the coastal zone. Guidelines to incorporate CRZ notification 2011.
2. Coastal Economic Activities			
Artisanal	Small boat fishing-	Long term	Strategies to provide stabilization of beaches and

Coastal Fisheries	mainly launched from beaches or estuaries	sustainabilities of beaches for landing catch and boat parking Temporary fishing huts and fish drying on beaches	dunes to mitigate impacts of increased beach instability from climate change. Avoiding use of rock walls which harm the beaches.
Mechanized Offshore Fisheries	Medium sized boats	Access to fishing harbors at all tidal conditions. Access to post harvest facilities.	Ports to incorporate climate resilience
Shipping	Small medium and large shipping companies	Navigation needs in coastal water and estuaries and harbors..	Guidelines on sea level rise will help assess requirements for ship navigation into harbors, estuaries. Increased instabilities of beaches from climate change will require effective use of dredged material for beach nourishment.
Tourism	Small and large hotels, boat operators, small and large restaurants and beach kiosks Tourist ships	Use of beaches for recreation Temporary tourist kiosks	Strategies to provide stabilization of beaches and dunes to mitigate impacts of increased beach instability from climate change.
Effluent	Government and private sector	Domestic and industrial effluents.	Changes in sea level and coastal currents and wave patterns to be incorporated into design of marine effluents facilities.
Sand Mining	Licensed and unlicensed sand mining operators	Sand mining in estuaries and rivers	Increased vulnerabilities of foreshore and estuaries may require restrictions on sand mining.
Potable water	River intakes/groundwater	Fresh potable water	Increased sea levels will affect salinity intrusion in rivers and coastal groundwater. Data on sea levels required for planning management of water sources.
3. Coastal Institutions			
Local Government	Panchayat (district - Zilla Parishad, Block - Panchayat Samity, Village/Gram Panchayat)	Development planning and administration in the rural areas.	Increased risks from sea level rise and storm surge to be incorporated into planning and disaster management. Awareness of coastal climate change risks will be supported by the project.
Environment and Forests	National and State Departments of Environment and Forest	Central level regulatory body-environmental policy and regulation Aspects of beach and dune management are within the remit of state environment departments and district forest officers	Improved assessments of coastal climate change to be incorporated into coastal planning and management. Participation of Forest Departments in pilot community projects and follow on upscaling
National CZMA	Ministry of Environment and Forests	National body with authorized by MoEF to oversee coastal activities	Improved assessments of coastal climate change to be incorporated into coastal planning and management
State CZMA	State Departments of Environment and Forests	State body authorized by MoEF to oversee coastal activities	Improved assessments of coastal climate change to be incorporated into coastal planning and management
Pollution Boards	Central and State Levels CPC and SPCB	Pollution management and regulation	Effluent discharges into coastal water to incorporate climate change.
4. Coastal Research Institutes			

Planning Design of Coastal Infrastructure	CWPRS	Lead institute for design of coastal infrastructure including coastal protection	Incorporation of climate resilience into planning and design of protection works
Oceanography and Meteorology	National Institute of Oceanography and Indian Institute of Tropical Meteorology	Sea level rise, isostatic changes, coastal ecosystems, climate change research	Climate change assessment and projections
Coastal processes and coastal zone management	Centre for Earth Sciences	Monitoring, data management and shoreline and coastal planning	Climate resilient shoreline and coastal planning
Coastal processes and coastal engineering	National Institute of Ocean Technology (NIOT)	Design of coastal infrastructure including coastal protection	Incorporation of climate resilience into planning and design of protection works
Fisheries	Central Marine Fisheries Research Institute	Coastal fisheries and ecosystem association	Bringing climate resilience in the fisheries sector
Coastal and harbor engineering	National Institute of Technology, Karnataka	Design of coastal infrastructure including coastal protection and harbors	Incorporation of climate resilience into planning and design of harbor and protection works
Geology	Geological Survey of India ,National Institute of Oceanography	Research on coastal land subsidence and emergence	Providing accuracy to climate resilient planning
Environment Impact Assessment	National Environmental Engineering Research Institute (NEERI)	Impact of coastal developments in the environment	Climate resilient coastal environmental planning
Coastal Ecology and coastal management	Integrated Coastal and Marine Area Management (ICMAM) and National Centre for Sustainable Coastal Management	Studies on coastal ecosystems , coastal regulatory processes and management protocols	Climate resilient coastal ecosystem management
Coastal processes and disaster management	Indian National Centre for Ocean Information Services (INCOIS) and IIT Delhi	Natural hazards such as tsunami, cyclones, storm surges are studied and warning systems developed	Climate resilient coastal disaster management
Ocean Engineering, Offshore Structures	IIT Madras and IIT Kharagpur	Design of coastal infrastructure including coastal protection and harbors	Incorporation of climate resilience into planning and design of protection works

Effective and maximum engagement with stakeholders will be one of project objectives, this will incorporate two parts; (i) identifying the interest and issues of the various stakeholders and developing appropriate measures for adaptation which will be done through consultations and workshops as well as the engagement of a panel of experts from all the coastal states and union/island territories; and (ii) communication to stakeholders of the adaptation guidelines which will be through the preparation and distribution of awareness materials.

B.7. Cost Effectiveness in the Project Design

The GEF/Support relative to the ADB funded SCPMIP is relatively small and the project design has been targeted to provide maximum leverage with the ongoing programs to achieve greatest value added. The GEF-SCCF project will build on the ongoing initiatives of the SCPMIP which provides a very large potential for up-scaling of the GEF-SCCF outputs under the loan program, during as well as after the GEF-SCCF project period.

The GEF-SCCF will undertake analysis and interpretation of ongoing coastal climate change research. There exists nationally and internationally a wide range of research material available which is dispersed and largely unavailable for application to planning and design for coastal protection and management in India. The GEF-SCCF project will engage specialist coastal scientists and engineers to undertake focused assessments and preparation of practical guidelines for climate change adaptation.

To ensure maximum value added and mainstreaming into actions, and Government policy and direction the following activities have been incorporated into the project design.

- (i). Outputs from the State Action Plans for Climate Change (SAPCC) would be analyzed in relation to the impacts and adaptation approaches proposed for the various maritime states and union territories. Close liaison would be kept with the SAPCC programs to ensure maximum integration and exchange of information.
- (ii). An independent advisory panel of experts will be appointed to review and endorse the project climate change analysis and guidelines for adaptation. To provide interaction of a wide geographical spread of expertise and incorporation of different coastal conditions each state and union territories will be requested to nominate one institute or coastal specialist, in addition to four national level experts will be appointed to the panel.
- (iii). The guidelines incorporating the findings of the panel of experts would be submitted to a Technical Committee to be constituted by the MoWR; the Technical Committee would review and provide official approval of the climate change adaptation guidelines.
- (iv). The project will work with the SCPMIP coastal planners and designers to support the incorporation of climate resilience into the shoreline planning outputs as well the designs for the sub projects for Tranches 2 and 3. Through these support measures project investments under Tranches 2 and 3 of the ADB loan would be built with resilience to climate change impacts.

In summary, the project will bring adaptation benefits at local, state and national levels. The project is considered highlight cost effective given the project's relatively small \$1.8 million intervention will; (i) develop endorsed national guidelines for integrating climate resilience within costal planning and management; (ii) directly support pilot testing of community based adaptation at 6 sites; (ii) directly support the integration of climate change resilience measures into over \$40million of major investments under the ADB/Government of India baseline project in two coastal states, and strengthening climate resilience over large parts of the coastline as well as investments in coastal infrastructure. The approaches will be applied /tested in two focal states and broader national uptake will be assisted through the capacity building, training of trainers and outreach activities.

B.7. Outline of the Coordination and Other Related Activities

The project will develop its main links with the ADB Sustainable Coastal Protection and Management Investment Program (SCPMIP) project has established offices in Karnataka (Mangalore) and Maharashtra (Mumbai) The GEF-SCCF project components correlate closely with the SCPMIP. In addition the GEF-SCCF projects incorporate with the following initiatives and linkages:

- (i). Incorporation of ongoing climate change research related to the coastal zones through Focal Indian Research organizations. Three focal institutions have been identified as the Indian Institute of Tropical Meteorology (IITM), National Institute of Oceanography (NIO) and Indian Institute of Technology (IIT) Delhi (see Section B.2 for further details).
- (ii). Maintain linkages with the MoEF Integrated Coastal Zone Management Project being implemented by MoEF with World Bank support. The project includes; (i) a national component which comprises mapping, delineation and demarcation of the hazard lines and delineation of coastal sediment cells all along the mainland coast of India (undertaken by the Survey of India); (ii) mapping, delineation and demarcation of Environmentally Sensitive Areas (ESAs); (iii) capacity building of the MoEF and the State Coastal Zone Management Authorities; (iv) a nation-wide training program for coastal zone management; and (v) Setting up of a National

Centre for Sustainable Coastal Management (NCSCM) at the Anna University, Chennai. At state level the project is working in three states Gujarat, Orissa and West Bengal, activities include ICZM planning, coastal management and investment projects. The GEF-SCCF project would consult with the MOEF-SICOM project for issues relating to integrated coastal planning to avoid duplication of efforts as well as better coordination between the two projects.

- (iii). The GEF-SCCF project activities shall coordinate with the CRZ authorities and ensure that all project activities and outputs shall comply with the CRZ notification 2011.
- (iv). State Action Plans for climate change (SAPCC) have been largely completed for all states. Of special relevance the plans for coastal states. The SAPCC have been prepared by different consultants for each state; the approaches and depth of analysis varies-for some states Indian Institutes linked with international climate organisations including the UK Meteorological Office. A number of follow on initiatives have now been funded. The GEF-SCCF project will analyze the outputs of the SAPCC related to maritime states and the coast line and apply the outputs of the SAPCC where appropriate into the climate change impact analysis and development of adaptation criteria and guidelines. The SAPCC outputs can potentially provide key state specific information on issues and adaptation responses which can be incorporated into the national level guidelines.
- (v). ADB/DFID TA8089 Operational Research to Support Mainstreaming of Integrated Flood Management under Climate Change. The MoWR together with ADB and DFID will implement studies and research to define climate change impacts on flooding together with the development of appropriate integrated flood response measures. The study will start late 2012 and would implemented over two years. The GEF-SCCF project and the ADB/DFID integrated flood management project are complementary especially for climate change adaptation
- (vi). ADB/Government of Tamil Nadu Climate Adaptation through Sub Basin Investment Programme in the Cauvery Delta proposed to start late 2012.

C. GEF AGENCY INFORMATION:

C.1 Confirm the co-financing amount the GEF agency brings to the project:

The GEF-SCCF will link to the Sustainable Coastal Protection and Management Project (SCPMIP). The project is being implemented through a \$404 million Multi-tranche Financing Facility (MFF) established for the two state governments of Karnataka and Maharashtra. The GEF-SCCF grant will be linked to both the ongoing first tranche of the MFF \$54.6 million (2012-2015). However it is expected that the outcomes of the project will result in mainstreaming of climate resilience measures within the design and implementation of infrastructure investments in the second and third tranches of the project which will continue to 2018.

The co-financing of the GEF-SCCF project has been taken as the Tranche 1 part (2012 to 2015) which is now firm loan to the States of Karnataka and Maharashtra and would be operational during the GEF-SCCF project implementation period. In addition the outputs of the GEF-SCCF project would be of direct benefit to Tranches 2 (estimated 2015 to 2018) and Tranche 3 (estimated 2016-2019); however as the actual values and scope of activities of these tranches remains provisional co-financing has been assessed based on Tranche 1

C.2 How does the project fit into the GEF agency's program (reflected in documents such as UNDAF, CAS, etc.) and staff capacity in the country to follow up project implementation:

India's 12th Five Year National Plan (2012-2017) is drafted but not yet issued; the report of the Steering Committee on Water Resources for the Twelfth Five Year plan prepared by the Planning Commission; identifies the need for further studies and research for obtaining detailed, precise and area-specific information on the impact of climate change on water resources, and the vulnerabilities of coastal communities. The steering committee report recommends that participatory action for mitigation and adaptation shall be taken in hand immediately. The report also identifies that data improvement including a coastal management information system should be viewed as national effort of the centre and the states; with the central government taking the lead in working out protocols and procedures and creating appropriate institutional arrangements to ensure that all agencies follow prescribed protocols and transmit the data to the central pool. The TA will support follow on actions and mainstreaming of strategies developed under India's National and State action plans for climate change in relation coastal adaptation measures. The ADB 2012-2014 country operation business plan (COPB) includes mainstreaming of adaptation for climate change and supporting the enhancement of the states for coastal protection and coastal resources management.

The TA will link and build on ADB Loan 2679 India Sustainable Coastal Protection and Management Project (SCMPIP) which is baseline project designed to address immediate coastal protection needs and coastal instabilities using

environmentally and socially appropriate approaches. The TA will build on and develop appropriate complementary actions to support adaptation measures for coastal climate change.

ADB will provide appropriate supervision capacity during project implementation to ensure effective delivery of expected results and execution of funds in accordance to ADB procurement and financial management procedures. At the country level ADB's India Resident Mission, through its Climate Change Specialist will provide support for the project's implementation along with staff from ADB Headquarters in Manila. ADB's Resident Mission has been providing assistance to the Government of India on climate change adaptation through a TA on "Support for the National Action Plan on Climate Change", which supports action at the central and state levels to move the National Water Mission of the National Action Plan on Climate Change (NAPCC).

Guided by its Long Term Strategic Framework (Strategy 2020) ADB is supporting a comprehensive program of transformative actions on climate change covering both mitigation and adaptation measures, and mainstreaming climate change considerations into its operations. ADB's support to building climate change resilience involves a multi-faceted approach guided by regional, country and local priorities as defined in national strategies, action plans, sector plans and assessments and informed by up-to-date science and knowledge products. Key areas of ADB's support include: National Adaptation Planning; Increasing Sector Resilience; Climate-proofing Projects; Integrating Climate Change Adaptation with Disaster Risk Management; Ecosystem-based Adaptation; and Enhancing Regional Cooperation. To ensure that development project outcomes, including those financed by ADB, are not compromised by climate change and variability, or by natural hazards in general, ADB supports: (i) testing and implementation of tools and cost effective approaches to reducing disaster risks, (ii) climate-proofing vulnerable investments and development programs; and (iii) up-scaling and disseminating lessons from climate-proofing and disaster risk management projects and programs. To disseminate and share the lessons and experience from these programs, ADB is also an active partner in a number of global and regional adaptation networks including the UNDP Global Adaptation Network and the Asia-Pacific Climate Change Adaptation Network and its South Asia node. With ADB's substantial infrastructure portfolio, there are substantial opportunities for ADB to mainstream such climate-proofing actions for all projects at risk.

ADB's significant role in India to date enables the ADB to garner political and institutional support from participating state governments to implement the project in a positive and cooperative manner. Through current work in India, the ADB is engaged directly with various government institutions and the national adaptation strategy. ADB's major comparative advantage is its ability to link GEF support on policy, planning and institutional strengthening to pilot demonstration and mainstreaming through the SCPMIP project, including the institutional links with the state authorities involved in coastal protection and management. Furthermore, there are good opportunities for lessons learned to be applied through other ADB supported investments. In India ADB is also supporting a number of climate change adaptation projects, including a technical assistance project on "Support for the National Action Plan on Climate Change" with a focus on providing support to the National Water Mission. This includes the preparation of strategic frameworks for integrated water resource management (IWRM) to address climate uncertainty; the preparation of a climate change adaptation road map for IWRM and the completion of specialist training and awareness-raising. The experience gained from these projects will enable linkage through 'catchments to coasts' environmental system linkages and sharing of lessons learned.

PART III: INSTITUTIONAL COORDINATION AND SUPPORT

A. INSTITUTIONAL ARRANGEMENT:

The Executing Agency (EA) for the project will be the Ministry of Water Resources (MoWR); the nominated focal person will be Chief Engineer Flood Management of the Central Water Commission (CWC) supported by the Director of Coastal Erosion. The EA will supervise and coordinate project execution. The MoWR will also constitute a National Technical Committee to review and endorse the project outputs including the guidelines for climate change adaptation. The Ministry of Environment and Forest (MoEF) is the GEF Focal Point in India and will provide support and coordination and ensuring compliance of the project with GEF guidelines and will also participate in program monitoring and evaluation.

A.1. Implementing Agencies (IA): The project will be implemented through three Implementing Agencies as follows:

- (i). At National Level the Central Water and Power Research Station (CWPRS) will be the IA. CWPRS will provide specialist technical support and guidance in the analysis and interpretation of climate change data as well in the implementation of training components. It is proposed that the GEF-SCCF consultants would be based at the CWPRS site in Pune. This location is easily accessible to the baseline project offices in Mangalore and Mumbai and also to CWC in Delhi.

- (ii). At state level, the IAs will be the Ministry of Public Works and Inland Waterways in Karnataka and the Maharashtra Maritime Board in Maharashtra. Project management and coordination will be through the established Program Management Units of SCPMIP which are within the two state level IAs.

Coordination and Liaison with Maritime States and Union Territories. Coordination will be through the Coastal Protection and Development Advisory Committee (CPDAC). The Member River Management in CWC is the chairman of the CPDAC and will support this important liaison function

A.2. Institutional Responsibilities

The four components of the GEF-SCCF project support will work through very close linkages with ongoing initiatives and programs of the Indian research agencies and the SCPMIP. The overall project execution will be under the direction of the executing agency MOWR/CWC; with the program implementation through the three implementing agencies. The scope of work and the institutional linkages will be slightly different for each component; with each having slightly different implementation responsibilities as shown in Table 9 below.

TABLE 9 INSTITUTIONAL RESPONSIBILITIES

Nr	Aspect/ Component	Primary Responsibility	Nodal Officer
	Overall Coordination Liaison and monitoring	Ministry of Water Resources Central Water Commission	Chief Engineer Flood Management CWC
Component 1	Analysis of climate change impacts in coastal areas and preparation of guidelines for climate change adaptation for the Indian coast.	Ministry of Water Resources and Central Water and Power Research Station (CWPRS)	Joint Director Coastal Division of CWPRS
Component 2	Climate resilient shoreline planning and management in two focal states.	Program Management Units of Karnataka and Maharashtra SCPMIP	Project Director SCPMIP Karnataka and Maharashtra
Component 3	Climate resilient coastal protection investments in two focal states	Program Management Units of Karnataka and Maharashtra SCPMIP	Project Director SCPMIP Karnataka and Maharashtra
Component 4.	Institutional strengthening, capacity building and enhanced awareness for climate resilient coastal protection and management.	Central Water and Power Research Station (CWPRS) National Water Academy Pune (component 4 training)	Director for Coastal Erosion CWC

A.3 National Technical Committee

The **National Technical Committee** will be constituted for the duration of the project; the committee will comprise of officials responsible for the project at Central and State Government and officials concerned in the subject from other ministries including the Department of Economic Affairs, National experts in coastal engineering and management and climate change adaptation will be deputized to support the technical committee. The MoWR will be responsible for the constitution, organization and selection of the members of the technical committee. The technical committee will be tasked to review and approve the 'Guidelines for Climate Change Adaptation'. To assist and streamline the approval process the guidelines will be subject to comprehensive review by a 'panel of experts' as well as endorsement by a 'technical institute from each of the maritime states and union territories'. The suggested composition of the National Technical Committee would include Chairman: Member-River Management CWC, Convener: Chief Engineer River Management CWC, Director, CWPRS Members: Nominee of MoWR, Nominee of MoEF, Nominee of MoES, Nominee of Bureau of Indian Standards; Project Directors, SCPMIP Maharashtra and Karnataka, Project Director MoEF-SICOM, Nominees of the Environment Agencies from the two focal states.

B. PROJECT IMPLEMENTATION ARRANGEMENT:

B.1 Project Implementation Consultants

The project will be implemented with support from an interdisciplinary group of international consultants consisting of research scientists, coastal engineers and specialists in natural protection, community natural resources management and training. The consultants will work at national, state, district and community levels. An input of 22 person-months of international consultants and 44 person-months of national consultants is proposed. Consultants will be engaged by ADB through a firm in accordance with ADB's *Guidelines on the Use of Consultants* (2007), and other arrangements satisfactory to ADB for engaging consultants following the quality cost based selection procedure at a ratio of 90:10 based on a full technical proposal. The consultancy assignment will prepare the outputs as described in Annex C. The consultancy will in addition will incorporate specific requirements for (i) engagement of three focal research institutes through sub-contracts to support the provision of information, data and implementation of specific studies relating to definition and quantification of the coastal climate change and impacts; (ii) project management of the pilot community projects including contracting of local community organizations to implement pilot natural protection activities; (iii) to organize and manage training courses, workshops, preparation of awareness materials and report production; and (iv) engagement of an advisory panel of experts to review and endorse the climate change analysis and adaptation guidelines. The consultancy contract will include provisional sums to meet the costs of these additional activities.

B.2 Focal Research Institutes

The climate change analyses, studies, and preparation of adaptation guidelines under Component 1 will build on the significant quantity of data and material that is available within the Indian research institutes; including; historic climatic and coastal data, climate change analyses and down scaling of projections. The proposed approach is for the international consultants to work closely with the three focal research institutes which will allow for continuation and building onto existing research work as well as providing for continuity of future research initiatives. The combination of the consultant working in conjunction with lead national research institutes would provide a very wide base of national and international expertise to meet the key needs of; integrating international and national climate change analysis and interpretation and the development of coastal climate change adaptation guidelines and provide strengthening of the national research, The combined team will allow for a maximum level of outputs in a short time frame. Three focal research institutes have been identified as being uniquely and the most qualified organizations to support the analysis of climate change scenarios and impacts. The relevant areas of expertise of the three focal institutes are described below.

- (i). **National Institute of Oceanography (NIO)** at Goa is engaged in basic and applied research in all the traditional areas of ocean research such as biological, physical, chemical and geological / geophysical by deploying a large team of scientists from these multidisciplinary areas. The studies related to sea level rise and storm surges have been recognized globally. It has established two-dimensional models for the prediction of sea levels and storm surges. The geological / geophysical studies of the coastal zone and the research on the tectonics of the eastern continental margin of India are examining the subsidence and emergence of the coastal land forms influencing the net sea level change estimates. NIO is also deeply involved in the study of sand dune / mangrove ecosystems.
- (ii). **Indian Institute of Tropical Meteorology (IITM)** in Pune has expertise and facilities for theoretical and observational meteorology and oceanography with special reference to Asian monsoon variability and predictability. Prediction of seasonal mean monsoon rainfall and extreme events are one of the important research areas of IITM. The Centre for Climate Change Research established in 2008 is steadily evolving and has initiated efforts for developing an Earth System model for understanding the interactive feedbacks among the various components of the earth system and how they affect the global and regional climate. IITM can participate in the prediction of extreme events of rainfall, the resulting floods, temperature, wind patterns, etc.
- (iii). **The Centre for Atmospheric Sciences (CAS) Indian Institute of Technology Delhi (IITD)** has all the traditional departments of engineering and many of them are involved in research related to climate change. The Centre is involved in research in several areas related to atmospheric sciences. The major areas are monsoon, general circulation and climate, coupled models, etc. The cyclones and storm surges have been one of the core areas of research of CAS and are of special relevance to the GEF-SCCF project. The CAS has highly qualified meteorologists, oceanographers, physicists and applied mathematicians in its faculty.

It is proposed that the project consultants would sub-contract the three focal research institutes to undertake specific analyses and studies. The studies require access to data and specialist analysis which is only available by the institutes directly or in cooperation with other institutes or individual specialists. The studies would primarily be to source and compile existing research which would not require significant levels of new research, each assignment would be

relatively small with a total cost of \$180,000 USD. The unique expertise and access to data of the focal institutes is not available from other sources and 'single source selection' is proposed. Each institute would be required to prepare a technical and financial proposal based on the outline scope of work is presented the Table below. The final TOR for the institutes would be prepared by the implementing consultants during the inception stage of the project. The institutes are able to support the externally funded assignments and would be able to support the project in the following areas:

- (i). National Institute of Oceanography (NIO): historic trends in sea levels, projections for sea level rise, changes in vertical land levels, projections for changes in predominant wave characteristics, projections for frequencies and intensities of storm waves.
- (ii). Indian Institute of Tropical Meteorology (IITM): downscaled wind, rainfall and temperature projections including analysis of uncertainty.
- (iii). Centre for Atmospheric Sciences IIT Delhi (CAS-IITD): analysis of historic and projected storm surges.

The international consultants will have the key responsibilities to prepare; (i) a briefing note for each climate study, the briefing note will build on the TOR and describe in more detail the approach to studies, relevant information sources and provision of research papers; (ii) support for the studies during the implementation and (iii) review of the draft study reports and (iii) compilation of the individual study outputs in an integrated analysis of the climate change impacts, preparation of GIS and preparation of the guidelines for climate change adaptation.

TABLE 10 EXPERTISE REQUIRED FOR THE STUDIES BY FOCAL RESEARCH INSTITUTES

Specific Climate Studies to be Contracted to National Research Institutes -Indicative scope of work	
Downscaled climate change projections of temperature, wind and rainfall	<ul style="list-style-type: none"> • Provision of downscaled projections for wind, extreme wind events, temperature and rainfall for the Indian coast. Through analysis of multiple models levels of uncertainty of the projections would also be prepared. • Output: Downscaled climate projection matrixes for the Indian coast.
Historic trends in sea levels	<ul style="list-style-type: none"> • Compilation of tidal monitoring, quality control, trend analysis. • Output: preparation of a database of historic sea level changes for Indian Coast
Projections of sea level rise from climate change	<ul style="list-style-type: none"> • Review of research into global sea level change • Apply downscaling and provide corrections to the Indian coast and linkages to historic trends of sea level change. • Develop probability of different scenarios. • Output: Preparation of a downscaled database of projected sea level changes including probabilities.
Analysis of Vertical land movements	<ul style="list-style-type: none"> • Collect and compile latest information and research on isostatic and local land settlement changes with particular reference to tidal stations and areas with pronounced level changes. • Output: preparation of a database of showing future vertical changes in land
Analysis of changes in wave characteristics from climate change	<ul style="list-style-type: none"> • Analysis of changes in wave characteristics for the Indian coast based on the IITM wind projections. • Analysis of the changes in frequency and intensities of storms based on IITM wind projections • Output: A database and GIS of the Indian coast showing changes in predominant and storm wave characteristics.
Analysis of projected changes in storm surges	<ul style="list-style-type: none"> • Analysis of current and projected storm surges for the Indian Coast using the downscaled projections for extreme wind and pressure information. • Coastal vulnerabilities are being assessed by the MoEF CZM project and not proposed for the GEF-SCCF project.

B.3. Community Projects Implementation Arrangements

Up to six pilot community projects will be implemented through the provision of grants to communities to implement community initiatives with an emphasis on natural protection measures; each project would include training and awareness, recruitment of community facilitators/ supervisors and implementation of beach and dune natural protection measures, each project would have a value of about \$70,000. Physical activities will be undertaken through small

village level contracts with registered community based organizations, NGOs or local contractors. Supervision and management would be at the village level through local stakeholders and officials. The design of each project and scope of work will be prepared by the GEF-SCCF consultants who would also provide training for potential bidders. Officially registered community organizations and other NGOs would be invited to present simple technical and financial proposals; the winning bidder would be selected by a small tender committee. The tender committee would be from local stakeholders, local forest officer and other local officials. Procurement will follow the Asian Development Bank Guidelines which require three quotes for small contracts below \$100,000

B.4. Independent Advisory Panel of Experts

An independent advisory panel of experts will be appointed to review and endorse the project climate change analysis and guidelines for adaptation. To provide interaction of a wide geographical spread of expertise and stakeholders and incorporation of different coastal conditions each the twelve maritime state and union territories will be requested to nominate one institute or coastal specialist (12 representatives) in addition to four national level experts will be appointed to the panel. The panel will be chaired by one elected member.

The implementation consultants would be tasked to analyze and synthesize reviews into the final version of adaptation guidelines. The identification of the members of the independent panel of experts would be through the individual maritime states and union/island territories.

B.5. Institutional Matrix

The proposed institutional arrangements are shown in Figure 1 below.

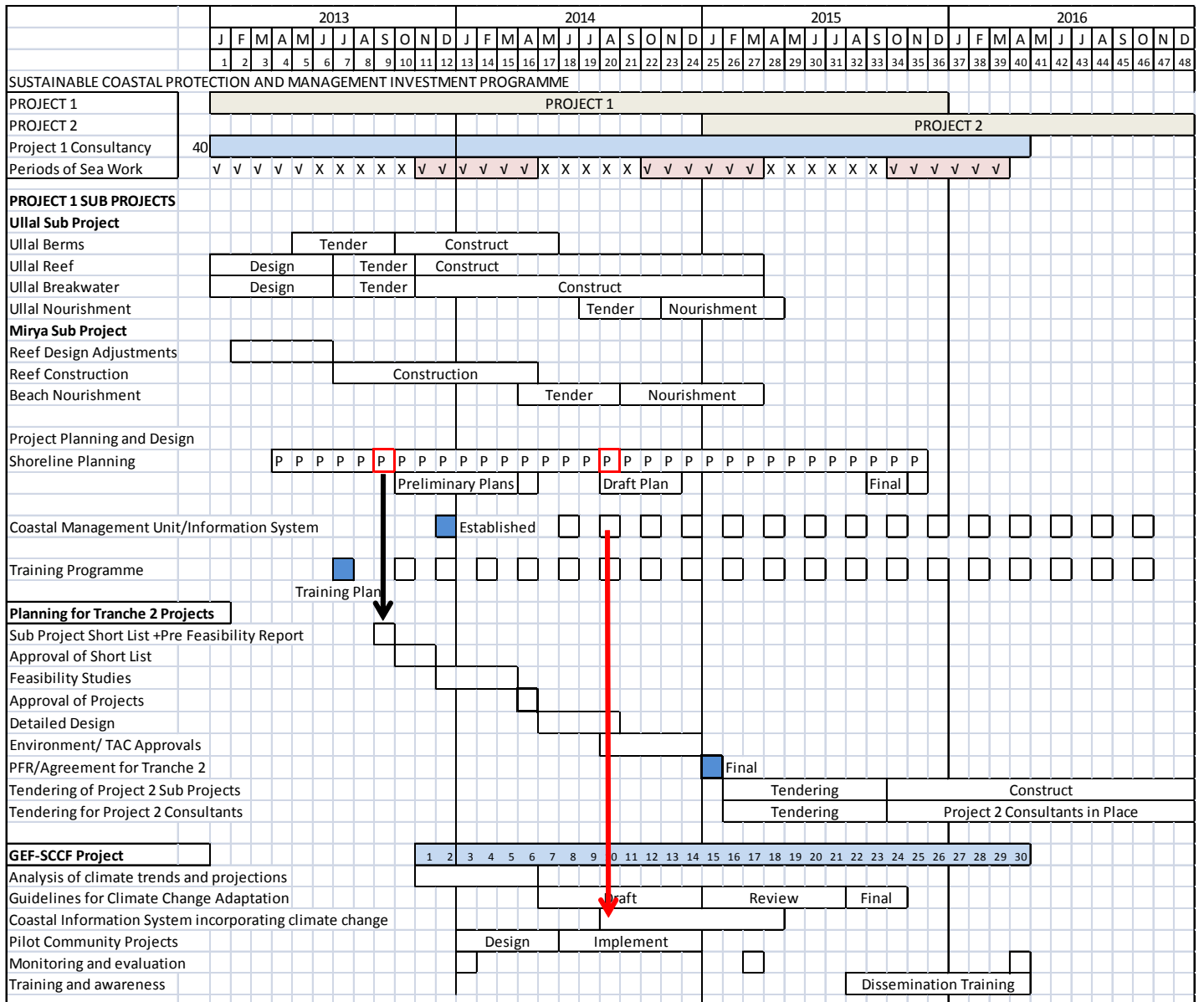
FIGURE 1 INSTITUTIONAL ARRANGEMENTS

GEF Project Functionary Organisations	Role	Organisation	Responsibilities	Specialist and Consultancy Support
GEF Focal Point	Compliance with GEF requirements	Ministry of Environment and Forests	Project monitoring and oversight	MoEF GEF Focal Point Consultant
Executing Agency	Project direction and coordination, liaison and approvals	Ministry of Water Resources through the Central Water Commission. Technical Committee to be established to review and endorse project outputs	Overall project direction and approvals of outputs	National Panel of Experts (5 persons)
Implementing Agencies	Technical analysis and endorsements, training	Central Water and Power Research Station (CWPRS) in association National Water Academy for Training (component 4)	Components 1 and 4	Implementation Consultants (International and national consultancy and project management team)
	Focal State	Project Director SCPMIP Karnataka Ports and Harbours Department	Components 2 and 3	
	Focal State	Project Director SCPMIP Maharashtra, Maharashtra Maritime Board		Focal Research Institutes (3 national institutes to support studies and analysis)
Maritime State Coordination Organisation	Outreach and coordination and liaison with other Maritime States	Coastal Protection and Development Advisory Committee (CPDAC)	Outreach to a wide range of technical expertise and geographical spread to support the final version of the adaptation guidelines.	Uniquely Qualified State Technical Institutes (to provide peer review of findings and adaptation guidelines (12 institutes- one institute from each maritime state and union territory)

B.6. Implementation Program

The linked implementation plan for the SCPMIP and the GEF-SCCF support program is shown in **Figure 2** below.

Figure 2 Baseline and GEF-SCCF Program



PART IV: EXPLAIN THE ALIGNMENT OF PROJECT DESIGN WITH THE ORIGINAL PIF

The project is consistent with the design proposed in the agreed PIF. Some adjustment to the project objectives have been made to strengthen the emphasis on developing strategies and mainstreaming.

Comments were received from various agencies including government of India, ADB and from the GEF Council. A key recommendation was that the that the GEF-SCCF project should go beyond the two coastal states; this was also requested by MoWR during the inception phase. To simplify the scope of activities and to reinforce the actions for the whole Indian coast the project design has been adjusted to four proposed components as shown below:

- (i). Component 1: Analysis of Climate Change Impacts in Coastal Areas and Preparation of Guidelines for Climate Change Adaptation for the **Indian Coast**
- (ii). Component 2: Climate Resilient Shoreline Management and Planning in **Two Focal States**
- (iii). Component 3: Climate Resilient Coastal Protection Investments in **Two Focal States**
- (iv). Component 4 Institutional Strengthening, Capacity Building and Enhanced Awareness for Climate Resilient Coastal Protection and Management in India.

Slight adjustments in the values of co-financing have been incorporated to take into account changes in the agreed value of the baseline project.

Although the project would support new initiatives and to some extent new technologies including those being developed by the baseline project. it has been agreed that the focal area strategies would be directed primarily at CCA-1 Reducing Vulnerabilities and CCA-2 Increasing Adaptive Capacity.

CCA-3 Adaptive Technology Transfer was included as a project outcome for the SCCF funded activities in the PIF. The feasibility of using GEF/SCCF funds for this activity was assessed during the PPG phase and it concluded that this outcome would be best addressed through the baseline project.

The baseline project will support economically viable protection works, using environmentally and socially appropriate solutions. With respect to new technologies, the baseline project will focus on techniques for the effective and unobtrusive shoreline and near shore control. This includes the replacement or modification of hard rock protection with softer options such as beach nourishments, dune management or submerged reefs. Work on coastal reefs will involve sand filled geotextiles, which aim to influence sand movement and retention in erosion prone areas. In the first tranche of the baseline project, reefs will be constructed at Mirya Bay and Ullal. A third reef is being considered at Coco Beach for Tranche 2 (subject to feasibility assessment). The design of these interventions has already included some climate dimensions, including the influence of sea level rise.

Output 3 of the baseline project will also (i) support enhanced capacity within districts and states to design, and implement shoreline protection and management projects, (ii) enhanced capacity of national private consultants and government institutes to provide specialist support for designing and reviewing coastal protection and management projects. Some degree of technology transfer can thus be supported by the baseline project; however the extent to which transfer will occur will depend on the results of the first demonstrations and overall perceptions of stakeholders on suitability for future use.

Given this, it was felt that the use of GEF/SCCF resources would be better targeted towards CCA 1 and CCA 2, which when taken together will already provide a very important outcome – that of mainstreaming climate change consideration in the shoreline planning process and plans for the 2 coastal states; and the preparation and testing of guidelines for coastal climate change management for the whole country.


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

- A. RECORD OF ENDORSEMENT OF GEF OPERATIONAL FOCAL POINT(S) ON BEHALF OF THE GOVERNMENT(S):**
(Please attach the [Operational Focal Point endorsement letter\(s\)](#) with this template. For SGP, use this [OFP endorsement letter](#)).

NAME	POSITION	MINISTRY	DATE (MM/dd/yyyy)
Mr Hem Pande	GEF Operational Focal Point	MINISTRY OF ENVIRONMENT AND FORESTS	05/03/2011

B. GEF AGENCY(IES) CERTIFICATION

This request has been prepared in accordance with GEF/LDCF/SCCF/NPIF policies and procedures and meets the GEF/LDCF/SCCF/NPIF criteria for CEO endorsement/approval of project.

Agency Coordinator, Agency Name	Signature	Date (Month, day, year)	Project Contact Person	Telephone	Email Address
Nessim Ahmad Director, Environment and Safeguards concurrently Practice Leader (Environment) Asian Development Bank		February 5, 2014	Arnaud Cauchois	+977 1 422 7779	acauchos@adb.org

ANNEX A: PROJECT RESULTS FRAMEWORK

Design Summary	Performance Targets/Indicators	Data Sources/Reporting Mechanisms	Assumptions and Risks
<p>Impact</p> <p>Strengthened resilience of the Indian coast to impacts of climate change</p>	<ul style="list-style-type: none"> • By the end of the baseline project 2019. • 50% of new and rehabilitated coastal protection and infrastructure projects in the two focal states incorporate climate resilience • 20% of major new and rehabilitated coastal protection and infrastructures outside the focal states incorporate climate resilience according to the SCCF supported guidelines • 20% of vulnerable shorelines in the two focal states incorporate low cost natural protection measures • Damage to coastal infrastructure and communities is 30% lower in locations where climate change resilience has been incorporated.. 	<p>Detailed Project Reports (DPR) submitted for approval by State Government and CWC and CWPRS</p>	<p>Assumption</p> <p>Maritime states accept the climate change adaptation guidelines and agree to pay for additional costs.</p> <p>Risk</p> <p>The political capacity for incorporation of climate resilience measures proves inadequate.</p>
<p>Outcome</p> <p>Climate change impacts are systematically incorporated into coastal protection and management interventions in India.</p>	<p>At the end of the Technical assistance (2016)</p> <ul style="list-style-type: none"> • Climate change adaptation guidelines are endorsed by MOWR and officially communicated to all maritime states and • SCPMIP Tranche 2 investments incorporate climate resilience measures • Proposals are prepared to support the incorporation of climate resilience for SCPMIP Tranche 3 investments union territories • Pilot community protection projects are successful and provide a workable model for upscaling. • Project clearances at State and Central levels require climate resilience to be incorporated into design of coastal infrastructure 	<p>Advisory notice from MOWR to maritime states/union territories to apply the adaptation guidelines and to ensure climate resilience is incorporated in coastal planning and design</p> <p>Data source: Detailed Project Reports (DPRs) for Tranche 2 subprojects</p> <p>TOR for tranche 3 design consultants to incorporate climate change resilience</p> <p>Monitoring and evaluation of the pilot community projects</p> <p>Questionnaires survey to communities</p>	<p>Assumption</p> <p>MOWR officially endorses climate change guidelines.</p> <p>Risk</p> <p>Delays in the start of the TA may limit the potential to incorporate climate resilience into Tranche 2 subproject designs.</p>
<p>Outputs</p>		<p>Data sources:</p>	<p>Assumption</p>

<p>1. Climate change adaptation guidelines for the Indian coast are prepared and officially endorsed.</p>	<ul style="list-style-type: none"> • Climate change trends and projections for the Indian coast analyzed and interpreted • Planning and design guidelines prepared and endorsed by panel of experts and national level Technical Committee • Coastal climate change parameters are incorporated into information systems being developed by central agencies 	<ul style="list-style-type: none"> • Analysis of reviews by panel of experts and state technical institutes • Minutes of national level technical committee meetings • Independent assessment of status and progress of the CWC coastal information system Progress reports of the Baseline project • Evaluation of coastal information system being developed by MOWR 	<p>Climate change projections are sufficiently robust to base decisions for climate change resilience measures.</p> <p>Risk There may be limited readiness and/or ability of central and state ministries to revise ordinance/regulations for the integration of climate change into design and investments.</p>
<p>2. Climate Resilient Shoreline Management and Plans in two focal states</p>	<ul style="list-style-type: none"> • Shoreline management plans in two focal states incorporate climate change impacts • Coastal information system in two focal states incorporate climate change parameters • Subproject designs for Tranche 2 in two focal states incorporate climate change resilience • Planning and design for six pilot projects are prepared and community organizations are established and engaged • Recommendations are prepared to incorporate climate resilience in the Tranche 3 sub-project designs 	<p>Data sources:</p> <ul style="list-style-type: none"> • Independent review of shoreline management plans in two focal states • Independent review of subproject design reports • Independent review of subproject designs and minutes of consultation meetings. Progress reports of the Baseline project 	
<p>3. Coastal Investment in two focal states incorporate climate resilience</p>	<ul style="list-style-type: none"> • Subproject Investments under Tranche 2 of the baseline project incorporate climate change resilience. • Up to six pilot community project in the two focal states are implemented with 50% of activities involving women. • Communities/ local stakeholders in pilot projects source funds and implement follow on maintenance activities 	<p>Data sources:</p> <ul style="list-style-type: none"> • Independent inspection of tranche 2 sub-projects after construction. • Evaluation of community pilot projects 2 years after completion of TA intervention. • Questionnaires to communities • Progress reports of the Baseline project 	
<p>4. Relevant institutions have strengthened capacity and enhanced awareness of coastal climate change and adaptation measures.</p>	<ul style="list-style-type: none"> • Training programs by the baseline project in two focal states incorporate climate change adaptation. • A cadre of 25 experienced trainers from various states and national institutions are given a 	<p>Data sources:</p> <ul style="list-style-type: none"> • Review of training reports including post training questionnaires • Questionnaires to cadre of trainers. • Progress reports of the Baseline project 	<p>Assumptions Trainees selected for training are actively involved in coastal protection and management activities and will not be transferred to other tasks.</p> <p>Risks Future follow on training is not conducted due to limited commitment or</p>

	<p>one-week training in the guidelines for climate change adaptation.</p> <ul style="list-style-type: none"> • Two senior level training courses for selected central level and maritime state officials and stakeholders are implemented • Awareness materials based on the climate adaptation guidelines are prepared and distributed. 		financial constraints.
<p>Activities with Milestones</p> <p>Preparatory Activities Funding approval by GEF (Q3/2013) Engagement of TA Consultants (Q4/2013) Engagement of Three Focal Research Institutes by TA Consultants (Q4/2013)</p> <p>1. Output 1: Analysis of climate change impacts in coastal areas and preparation of guidelines for climate change adaptation</p> <p>1.1 Climate change trends and projections for the Indian coast analyzed and interpreted (Q2/2014). 1.2 Planning and design adaptation guidelines prepared and endorsed by panel of experts and national level Technical Committee (draft Q3/2015, final endorsed Q4/2015). 1.3 Recommendations for incorporation of climate change parameters national coastal information systems (Q3/2014).</p> <p>2. Output 2: Climate Resilient Shoreline Management and Plans in two focal states</p> <p>2.1 Shoreline management plans and coastal information systems in two focal states incorporate climate change parameters and potential impacts (Q/2014) 2.2 Subproject design in two focal states incorporate climate change resilience (Tranche 2 Q4/2013) 2.3 Planning and designs for six community pilot protection projects are prepared and community organizations are established and engaged. (Q4/2013) 2.4 Proposals for incorporation of climate resilience for Tranche 3 designs (Q3/2015)</p> <p>3. Climate Resilient Coastal Investment in two focal states</p> <p>3.1 Tranche 2 investments under the baseline project incorporate climate change (Tranche 2 Q2/2015) 3.2 Pilot community project in the two focal states are implemented with 50% of activities involving women (Q4/2014) 3.3 Communities/ local stakeholders source funds and implement follow on maintenance activities (Q3/2015)</p> <p>4. Institutional strengthening, capacity building and enhanced awareness for climate resilient coastal protection and management</p> <p>4.1 Training programs by the baseline project in two focal states incorporate climate change adaptation(Q3/2015) 4.2 A cadre of 25 experienced trainers from various states and national institutions are given a one week training in the guidelines for climate change adaptation (Q1/2015) 4.3 Two senior level training courses for selected central level and maritime state officials and stakeholders are implemented (Q3/2015) 4.4 Awareness materials based on the climate adaptation guidelines are prepared and distributed (Q3/2015)</p>			<p>Inputs Global Environment Facility Special Climate Change Fund \$2,000,000</p> <p>Government of India: (i) Counterpart staff, office space, support to source data and facilitate linkages with research institutes. (ii) Co-financing of the baseline project with ADB Sustainable Coastal Protection and Management Project (SCPMIP) whole MFF \$404 million, tranche 1 \$62.5 million.</p>

ANNEX B: RESPONSES TO PROJECT REVIEWS

Comment	Response
GEF Council (PIF stage)	
1/ Germany approves the strong focus on soft measures, community participation and joint planning, climate proofing and integration into policy at all levels.	The project will continue to support soft protection measures including the implementation of pilot community protection projects.
2/ Germany kindly asks to clarify why the vulnerability assessment is limited to investments supported by another ADB project ("Climate change vulnerability assessments undertaken for selected coastal zones in the target states linked to investments supported by the ADB Sustainable Coastal Protection and Management Investment Program (SCPMIP)", p. 3). This project seems to go beyond the SCPMIP ADB project with the expected outcome "increased awareness and capacity of sector agencies at National and State levels regarding the assessment of climate change impacts and adaptation options for coastal protection interventions". However, SCPMIP seems to be the baseline project for this. Specification on eventual criteria for selecting certain sites would be helpful.	<p>The scope of the project has been discussed with stakeholders and there is strong feedback of the need to address the needs of the whole Indian coast as well as the two focal states under the ADB SCPMIP. Based on this the project has been divided into four components as below.</p> <p>Component 1: Climate Change and Analysis and preparation of guidelines-will be directed at the whole Indian Coast. Component 2: Climate Resistant Shoreline Planning and Management will focus on the two focal states of the baseline project. Component 3: Climate Resilient Coastal Protection will focus on the two focal states. Component 4: Institutional Strengthening will support directed at the national level as well as other maritime states and union territories. The baseline project will undertake the preparation of shoreline management plans for the whole coast and these will be the basis of selection of sub projects under the baseline project. The GEF-SCCF project will implement pilot community protection projects and criteria for selection are described in section.</p>
3/ As to the PIF, GEF/SCCF support will align closely with State Action Plans on Climate Change where they have been completed and support their finalization (p. 7). (GIZ) GmbH supported the development of State Action plans in 16 other states. Options for up-scaling should be considered. GIZ recently started a small scale demonstration project to test stabilization of embankments. Exchanges would be fruitful regarding the GEF/SCCF project's focus on designing coastal erosion protection infrastructure (p. 15), particularly on soft measures.	<p>The outputs of the State Action Plans for Climate Change with reference to the maritime states and coastal adaptation planning will form an important input to the study as described in section A.6.</p> <p>Analysis of the State Action Plans and follow on actions forms a key part of the development of the climate adaptation guidelines; coordination and liaison with GIZ will be taken up.</p>
Ministry of Water Resources India	
Suggested that training components should be taken up in collaboration with the National Training Academy Pune (a key training arm of MoWR)	Agreed-the training would be developed through CWPRS in association with the National Training Academy
Ministry of Environment and Forest India	
Implementation period of 24 months is too short	Implementation period increased to 30 months
Clarification that assessments will be for whole Indian coast	Confirmed and clarified.
Training should be sustainable and linked to a Nodal Agency	Agreed-the National Water Academy an arm of the Ministry of Water Resources has been proposed as the Nodal Agency for training
The linkages with the State Action Plans for Climate change should be strengthened	Agreed this has been incorporated.
Climate resilience actions must be compliant with the notifications of the coastal resilience zones.	Agreed this has been incorporated.

Questions	Secretariat Comment At CEO Endorsement(FSP)	Response
GEF ID: 4536		
Country/Region: India		
Project Title: Climate Resilient Coastal Protection and Management		
GEF Agency: ADB GEF Agency Project ID:		
Type of Trust Fund: Special Climate Change Fund (SCCF)		
GEF Focal Area (s): Climate Change		
GEF-5 Focal Area/ LDCF/SCCF Objective (s): CCA-1; CCA-1; CCA-1; CCA-2; CCA-2; CCA-3; CCA-3; Project Management;		
Anticipated Financing PPG: \$0 Project Grant: \$1,818,182		
Co-financing: \$54,334,000 Total Project Cost: \$56,152,182		
PIF Approval: September 19, 2011 Council Approval/Expected: November 10, 2011		
CEO Endorsement/Approval Expected Project Start Date:		
Program Manager: Saliha Dobardzic Agency Contact Person: Arnaud Cauchois		
<p>7. Is the project aligned with the focal /multifocal areas/ LDCF/SCCF/NPIF results framework?</p>	<p>Not yet clear. While the project is aligned with CCA-1 and CCA-2 of the SCCF Framework, please include in document, more justification to why CCA-3 (Technology Transfer) was no longer appropriate for project. Recommended Action: Please provide justification for the removal of CCA-3.</p>	<p>CCA-3 Adaptive Technology Transfer was included as a project outcome for the SCCF funded activities in the PIF. The feasibility of using GEF/SCCF funds for this activity was assessed during the PPG phase and it concluded that this outcome would be best addressed through the baseline project.</p> <p>The baseline project will support economically viable protection works, using environmentally and socially appropriate solutions. With respect to new technologies, the baseline project will focus on techniques for the effective and unobtrusive shoreline and near shore control. This includes the replacement or modification of hard rock protection with softer options such as beach nourishments, dune management or submerged reefs. Work on coastal reefs will involve sand filled geotextiles, which aim to influence sand movement and retention in erosion prone areas. In the first tranche of the baseline project, reefs will be constructed at Mirya Bay and Ullal. The design of these interventions has already included some climate dimensions, including the influence of sea level rise.</p> <p>Output 3 of the baseline project will also (i) support enhanced capacity within districts and states to design, and implement shoreline protection and management projects, (ii) enhanced capacity of national private consultants and government institutes to provide specialist support for designing and reviewing coastal protection and management projects. Some degree of technology transfer can thus be supported by the baseline project; however the extent to which transfer will occur will depend on the results of the first demonstrations and overall perceptions of stakeholders on suitability for future use.</p> <p>Given this, it was felt that the use of GEF/SCCF resources would be better targeted towards CCA 1 and CCA 2, which when taken together will already provide a very important outcome – that of mainstreaming climate change consideration in the shoreline planning process and plans for the 2 coastal states; and the preparation and testing of guidelines for coastal climate change management for the whole country.</p>

<p>11. Is (are) the baseline project(s), including problem (s) that the baseline project(s) seek/s to address, sufficiently described and based on sound data and assumptions?</p>	<p>Not yet clear. While the project is supported through a three tranche program of ADB investments, it is unclear to what extent the three tranches contribute to the baseline project outputs described in section B.1.3.</p> <p>Furthermore, it is indicative from the document that the SCCF project cofinancing will be supported through Tranche 1; and as such, outputs from activities implemented Tranche 1 activities need to be more clearly described, including specific descriptions to how these activities will contribute to the SCCF project components, in alignment with project framework table B.</p> <p>Recommended Action: 1) Please provide more detailed description on activities/milestones to be completed across the three baseline project Tranches, and 2) indicate alignment of Tranche 1 activities with project components identified.</p>	<p>A draft implementation schedule has been provided in Section B.6 (Figure 2) of the CEO Document. This will be updated at the commencement of the project. As there has been some serious slippage in the baseline project implementation, it is still feasible to link the SCCF funded activities with the tranches of the baseline project. The key links are described below:</p> <ul style="list-style-type: none"> • Tranche 1 will support integrated coastal planning processes and shoreline management information systems. These actions will be ongoing through to the end of 2015. Climate considerations will be integrated in the process. Even after the completion of the process, plans can still be updated in the future. • Tranche 1 investments (sub-projects) will be implemented till mid-2015. Lessons from this process can inform the design of subsequent GEF activities. • Tranche 2 investments (sub-projects) will be implemented from 2015. GEF support for climate change assessment will support the design process. • Tranche 3 investments are expected to be implemented after 2016. The outcomes of GEF supported activities (assessment, climate sensitive shoreline planning and initial lessons from demonstration projects will be fully mainstreamed in the baseline project investments. <p>With respect to financing – ADB has committed to a \$250 million funding envelope for the 3-tranches baseline project, out a total estimated cost of \$404.6 million. Of this, a loan of \$51.6 million has been provided under the first periodic financing request for the first tranche. This provides the main base for the SCCF, particularly the work around planning, management and capacity development for the management of coastal zones. Subsequent tranches (2-3) will be funded through the initial \$250 million funding envelope, which will be drawn down through periodic financing requests. The subsequent tranches will essentially focus on investment activities, the design of which will be informed by the SCCF funded activities.</p> <p>Over the life of the SCCF implementation, co-finance is therefore likely to be larger than the amount currently estimated.</p>
<p>12. Has the cost-effectiveness been sufficiently demonstrated, including the cost-effectiveness of the project design approach as compared to alternative approaches to achieve similar benefits?</p>	<p>Not yet clear. While the project supports numerous ongoing initiatives at the national and local level, providing significant opportunities for scaling up, a more comprehensive cost comparison with alternative approaches can be provided in section B.7.</p> <p>Recommended Action: please provide a more comprehensive cost-assessment, including comparison with alternative scenarios.</p>	<p>Participatory shoreline management plans will be prepared to meet long-term shoreline management needs in the participating coastal states. Shoreline plans will address key issues of the coastal processes, shoreline land use, and present proposals for the long-term sustainable management and protection of the shoreline. The plans will also identify potential economic development opportunities. The investment program will support management and supervision of subproject implementation, and planning and design of subprojects for future tranches of the baseline project, as well as the GEF supported demonstration projects. Planning and design of these subprojects will be based on the shoreline management plans prepared under tranche 1. The planning process is a three stage approach which</p>

		includes prefeasibility study, feasibility study and detail designs. Study of the potential alternative design to each sub-project is undertaken essentially during the pre-feasibility study and the best option is retained for feasibility study and if proven viable for detail design.d...
14. Is the project framework sound and sufficiently clear?	Not yet clear. See comments in 11, 12 and 13. Recommended Action: Please address comments in 11 and 13, and provide a clear indication of how activities in Tranche 1 link to the SCCF project components and co-financing amounts provided in project framework Table B.	Please see responses to 11, 12 and 13 above.
15. Are the applied methodology and assumptions for the description of the incremental/additional benefits sound and appropriate?	Not yet clear. Recommended Action: Please address comments in 11, 13, and 14.	Please see responses to 11, 12 and 13 above.
19. Is the project consistent and properly coordinated with other related initiatives in the country or in the region?	Not yet clear. While the project identifies linkages with the baseline project (SCPMIP), more information can be provided on coordination with other external initiatives. Recommended Action: Please provide more information on coordination with other external initiatives.	<p>Baseline project: There has been limited external assistance for coastal protection and management in India. Nearly all investment funding has been from the states, central government, and the private sector. The lack of external assistance has resulted in a lack of exposure to new ideas and practices. The World Bank has approved the Integrated Coastal Zone Management Project (ICZMP) and ADB has worked closely to harmonize interventions for coastal protection in India. The focus of the World Bank's project is on coastal zone management, mapping, and planning; and piloting integrated coastal zone management in the states of Gujarat, Orissa, and West Bengal. The focus of the proposed ADB-supported investment program is on designing innovative coastal erosion protection infrastructure and other soft measures in the states of Karnataka, and Maharashtra.</p> <p>For the GEF/SCCF supported activities, the project preparation process identified that coordination with the World Bank supported Coastal Zone Management Project; and coordination with national focal point institutions for coastal zone climate research would be most important for the projects' success. Further clarifications are provided below:</p> <ul style="list-style-type: none"> • Component 1 will focus on the analysis of climate change impacts in coastal areas and preparation of guidelines for climate change adaptation. This work will be undertaken in close cooperation and building on existing / ongoing research related to the climate change and coastal zones by 3 focal institutions: the Indian Institute of Tropical Meteorology (IITM), National Institute of Oceanography (NIO) and Indian Institute of Technology (IIT) Delhi. Case studies from the WB Coastal Zone Management Project will also be reviewed as a basis for planning and design criteria and guidelines for coastal climate change adaptation. • Component 2 will be guided by State Action Plans for Climate Change and will be linked to coastal planning support provided by the baseline project. Shoreline plans under the baseline project are being developed in close

		<p>coordination with the ICZM project which is developing national guidelines for shoreline planning</p> <ul style="list-style-type: none"> • Component 3 will undertake pilot demonstration activities. These will be implemented in close coordination with the baseline project and linked to the states shoreline planning processes (and consistent with State Action Plans for climate change). Close reference will be made to the MoEF/World Bank ICZMP which is defining the coastal zone hazard line for the whole Indian Coast. <p>Note also that coordination and awareness of other relevant initiative throughout the life of the project will be strengthened through a National Technical Committee, which will play a key role in reviewing adaptation guideline prepared by the project. Suggested composition includes MoEF, MOWR, the Central Water Commission, Bureau of Indian Standards; SCPMIP Maharashtra and Karnataka, and nominees of the Environment Agencies from the two focal states.</p>
21. Is the project structure sufficiently close to what was presented at PIF, with clear justifications for changes?	Not yet clear. Recommended Action: Please include justification of removing CCA-3 from project framework.	Part IV of the CEO Endorsement Document "ALIGNMENT OF THE PROJECT DESIGN WITH THE ORIGINAL PIF" has been updated consistent with the response provide to Question 7 above.
24. Is the funding and co-financing per objective appropriate and adequate to achieve the expected outcomes and outputs?	Not yet clear. Recommended Action: Please address comments in 11, 13, and 14.	Please see responses above.
25. At PIF: comment on the indicated cofinancing; At CEO endorsement: indicate if confirmed co-financing is provided.	Not yet clear. Recommended Action: Please address comments in 11, 13, and 14.	Please see response above.

ANNEX C: CONSULTANTS TO BE HIRED FOR THE PROJECT USING THE GEF-SCCF RESOURCES

Position Title	\$ / Person Months	Estimat ed Person Months	Tasks to be Performed
For Project Management			
Local			
Finance and Administrative Assistant	1,100	20.73	<ul style="list-style-type: none"> • Ensure timely and efficient organization and project records • Assist with project communications, records and finances
Justification for travel, if any: Occasional domestic travel in India to visit focal states and central government in Delhi			
For Technical Assistance			
Local Consultants			
Co-Team Leader Coastal Engineer	5909	16	<ul style="list-style-type: none"> • To support the International Team leader in all tasks and to support coordination, liaison with government and stakeholder and maintain project direction and programming during the absence of the team leader from the project. • Coordinate and liaise with the baseline project activities including incorporation of climate resilience into shoreline planning and sub project designs. • To be responsible for monitoring project progress and ensuring outputs meet the project targets. • To prepare contracts and project manage the sub contracts including the three focal research institutes, pilot projects, training and monitoring and evaluation. • To assess design implications and estimated costs to incorporate climate change resilience for typical coastal protection works. • To support the preparation of climate change adaptation criteria and guidelines based on outputs from consultants and focal research institutes. • To support the incorporation of climate change parameters into the information systems. • To support the inputs by the panel of experts and ensure smooth liaison between the experts and other technical specialists. To synthesize and summarize the findings of the panel of experts. • In coordination with other consultants supervise the pilot community projects and the training and awareness programs • To ensure all project expenditures are properly documented according to Government and ADB requirements.
Coastal Management Specialist	5909	5	<ul style="list-style-type: none"> • Review the SCPMIP shoreline planning in the two focal states and prepare specific recommendations for incorporation of climate change resilience into the shoreline plans • In coordination with other consultants to interpret assess the potential impacts of the projected climate changes on the coast. • To review ongoing coastal climate change studies including the State Action Plans for Climate Change (SAPCC) and the MoEF ICZM program and extract key findings which can be used to support the TA outputs • Develop climate change scenarios and possible climate change adaptation measures that can be taken forward for detailed analysis. • To work with the engineers and climate economist to develop the cost benefit analysis of different adaptation strategies. • To support the preparation of the adaptation guidelines, modules for training and awareness materials
Coastal Morphologist Beach	5909	5	<ul style="list-style-type: none"> • To review outputs of shoreline management plans in the two focal states and other parts of the Indian Coast with special reference to morphological impacts of climate change on the equilibrium of beaches and coastal

Position Title	\$ / Person Months	Estimated Person Months	Tasks to be Performed
Management Specialist			<p>wetlands (mud flats).</p> <ul style="list-style-type: none"> • To undertake more detailed analysis of not less than five case studies, to assess the current issues of instability and the potential future impacts of climate change. • Present proposals and outline designs and specification to support stabilization of beaches and coastal wetlands under scenarios of climate change • To prepare strategies and outline approaches for pilot community projects • To support selection of pilot sub projects locations • To support the preparation of the adaptation guidelines, modules for training and awareness materials. • To work with the community specialist in the selection, design and implementation of the community pilot projects. • To prepare awareness materials to provide increased understanding of vulnerabilities of the beaches and potentials to reduce degradation and erosion through beach management • To support the preparation of the adaptation guidelines, modules for training and awareness materials with special reference to beach management.
Institutional/Training Specialist	5909	5	<ul style="list-style-type: none"> • To review the institutional base for coastal protection and management and climate change adaptation • Identify the institutional and capacity constraints for adaptation to coastal climate change adaptation. • Develop strategies to support training and awareness for coastal climate change adaptation • To prepare the approach and details for an integrated program of training and awareness under the TA including the adaptation guidelines, training of trainers, modules for training courses and the design of the awareness campaign
Community Specialist	5909	5	<ul style="list-style-type: none"> • To support the identification, selection and design of the community pilot projects. • To lead the community engagement and awareness programs for community projects. • To work with the communities to identify appropriate models for community cooperation with special reference to co-financing and agreements to ensure long term sustainable finance after the end of the TA program. • To work in the communities to develop the terms of reference and contractual arrangements for the pilot community projects. • To develop appropriate mechanisms to guide and supervise the community projects. • To support the supervision of the community projects and to provide follow on support to ensure long term sustainability. • To support the preparation of the adaptation guidelines, modules for training and awareness materials with special reference to strategies and mechanisms for community based coastal protection programs.
Coastal Ecologist	5909	4	<ul style="list-style-type: none"> • To assess potential ecological effects of climate change on the coast with special reference to impacts of climate change on mangrove, dunes and coral reefs and the resulting effects on coastal erosion and instabilities. • To review ongoing mangrove research and propose strategies to increase the sustainability of mangrove under changing climatic conditions. • To work with data management specialist to source GIS mapping mangrove and coral reefs for the Indian coast • To advise on appropriate types of dune vegetation to be incorporated into the pilot projects • To support the development of adaptation guidelines in relation to

Position Title	\$ / Person Months	Estimated Person Months	Tasks to be Performed
			ecological coastal protection
Data Management GIS Specialist	5909	4	<ul style="list-style-type: none"> • To work with the TA consultants and the research institutes to prepare the design of a coastal climate change information system. • To work with the SCPMIP consultants to assess how the outputs of the TA studies can be incorporated into the coastal data management system. • To liaise with CWC and the MoEF and other organisations who have established or proposed data management systems. Review the various systems and assess how a common data system could evolve. • Design the framework and metadata for a coastal climate change data system. • To work with a GIS technician to be recruited and prepare the GIS coastal climate change information system and prepare modules for training. • To support the preparation of the adaptation guidelines, modules for training and awareness materials.
Independent Advisory Panel of experts			
Independent Advisory Panel of Experts: 16 experts (1 from each of the 12 maritime states and union territories and 4 national experts).	7000	8 person months (each expert 2.2pw input)	<ul style="list-style-type: none"> • To undertake a peer review of guidelines for coastal climate change adaptation • To help define specific issues and adaptation measures relevant to each coastal state union territory.
International Consultants			
Team Leader/Coastal Engineer/Climate Change Specialist	25000	6	<ul style="list-style-type: none"> • To plan and coordinate all the inputs and outputs from the consultants. • In coordination with various consultants prepare briefing papers outlining the latest international research findings and proposed work plans for the focal research institutes and review outputs from the institutes. • To assess needs and implications and estimated costs to incorporate climate change resilience for typical coastal protection works and coastal infrastructure. • To coordinate the preparation of climate change adaptation criteria and guidelines based on outputs from consultants and focal research institutes. • To support the incorporation of climate change parameters into the information systems and support coordination with the other systems at state and central level. • To support the briefing of the technical committee and support the processes of endorsement of the guidelines and the establishment of coastal adaptation policy.
Meteorologist/Climate Change Specialist	25000	2	<ul style="list-style-type: none"> • Will carry out a comprehensive review of international and Indian climate prediction research with specific reference to the projected changes and on the Indian coast. • Work closely with the Indian climate research institute in the preparation of the downscaled climate projections. • Advise the various experts on the probabilities and uncertainties of climate change and the development of approaches to incorporate uncertainty into the climate change guidelines. • Support the preparation of the adaptation guidelines, modules for training and awareness materials.
Coastal Oceanography /Climate Change Specialist	25000	3	<ul style="list-style-type: none"> • To analyze and interpret latest research on historic and projected sea level changes and other coastal climate change effects both globally and with special reference to the Indian coast. • To analyze research on current and projected storm surges both globally and relating to India.

Position Title	\$ / Person Months	Estimated Person Months	Tasks to be Performed
			<ul style="list-style-type: none"> • To compile best estimates of projected changes in sea level for Indian including local variations and effects of changes in land levels and where possible support the assignments of probabilities of different events • Support the preparation of coastal adaptation guidelines. • Support the preparation of the adaptation guidelines and modules for training and awareness materials
Coastal Engineering Design Specialist	25000	4	<ul style="list-style-type: none"> • To review the various climate change impacts and assess the likely implications on coastal protection and coastal infrastructure • To review current standards and norms for coastal engineering and present adjustments to meet the needs of climate resilience. • To work with the climate change economist to support the analysis of cost benefits of various adaptation strategies. • To work with other consultants to develop design guidelines for beach and mangrove consultants under climate change. • Prepare guidelines for designers to accommodate climate resilience into coastal infrastructure design including hard and soft technologies for coastal protection. • Support the SCPMIP designers to incorporate climate resilience for the tranche 2 designs and to prepare recommendations for climate resilience for the possible sub projects identified for Tranche 3 under the shoreline planning activities. • In consultation with CWPRS and other coastal design organizations prepare recommendations for long term strengthening of coastal engineering design to meet climate impacts including hard and soft solutions. • Support the preparation of the adaptation guidelines and modules for training and awareness materials.
Climate Change Economist	25000	2.5	<ul style="list-style-type: none"> • To prepare an analysis of risks of not incorporating climate change resilience into coastal protection and other infrastructure. The analysis should be based on case studies for typical coastal coastal protection and management situations. • Prepare a cost benefit analysis and sensitivity analysis of various approaches and scenarios for coastal protection including economic assessments of the approaches to incorporate climate resilience into coastal infrastructure. The analysis will be based on selected projects identified under the shoreline planning of SCPMIP. • Support the preparation of the adaptation guidelines, modules for training and awareness materials with special reference to the cost benefit of incorporation of climate resilience.
Coastal Morphologist/beach management specialist	25000	2.5	<ul style="list-style-type: none"> • To review outputs of shoreline management plans in the two focal states and other parts of the Indian Coast with special reference to morphological impacts of climate change on the equilibrium of beaches and coastal wetlands (mud flats). • To undertake more detailed analysis of not less than five case studies, to assess the current issues of instability and the potential future impacts of climate change. • Present proposals and outline designs and specification to support stabilization of beaches and coastal wetlands under scenarios of climate change • To prepare strategies and outline approaches for pilot community projects • To support selection of pilot sub projects locations • To support the preparation of the adaptation guidelines, modules for training and awareness materials.
Institutional/training specialist	25000	2	<ul style="list-style-type: none"> • To review the institutional base for coastal protection and management and climate change adaptation • Identify the institutional and capacity constraints for adaptation to coastal

Position Title	\$ / Person Months	Estimated Person Months	Tasks to be Performed
			climate change adaptation. <ul style="list-style-type: none"> • Develop strategies to support training and awareness • To prepare the approach and details for an integrated program of training and awareness under the TA including the adaptation guidelines, training of trainers, modules for training courses and the design of the awareness campaign.

Project Management Costs	<ul style="list-style-type: none"> • Finance/Admin Specialist 83.6 person weeks @ \$273/week • Office costs including rental electricity, maintenance 88 weeks @\$160/week • International Travel for international consultants 14 return airfares @\$3000 per return airfare • National Travel for national and international consultants within India 155 single trips @\$120/trip • Land transport vehicle hire 94 weeks @ \$100/week 		
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ANNEX C: CONSULTANTS TO BE HIRED FOR THE PROJECT USING GEF/LDCF/SCCF/NPIF RESOURCES

<i>Position Titles</i>	<i>\$/ Person Week*</i>	<i>Estimated Person Weeks**</i>	<i>Tasks To Be Performed</i>
For Project Management			
Local			
International			
Justification for travel, if any:			
For Technical Assistance			
Local			
International			
Justification for travel, if any:			

* Provide dollar rate per person week. ** Total person weeks needed to carry out the tasks.

ANNEX D: STATUS OF IMPLEMENTATION OF PROJECT PREPARATION ACTIVITIES AND THE USE OF FUNDS

A. EXPLAIN IF THE PPG OBJECTIVE HAS BEEN ACHIEVED THROUGH THE PPG ACTIVITIES UNDERTAKEN.

NA

B. DESCRIBE FINDINGS THAT MIGHT AFFECT THE PROJECT DESIGN OR ANY CONCERNS ON PROJECT IMPLEMENTATION, IF ANY:

NA

C. PROVIDE DETAILED FUNDING AMOUNT OF THE PPG ACTIVITIES AND THEIR IMPLEMENTATION STATUS IN THE TABLE BELOW:

<i>Project Preparation Activities Approved</i>	<i>Implementation Status</i>	<i>GEF/LDCF/SCCF/NPIF Amount (\$)</i>				<i>Cofinancing (\$)</i>
		<i>Amount Approved</i>	<i>Amount Spent To date</i>	<i>Amount Committed</i>	<i>Uncommitted Amount*</i>	
NA	(Select)					
	(Select)					
	(Select)					
	(Select)					
	(Select)					
	(Select)					
	(Select)					
	(Select)					
Total		0	0	0	0	0

* Any uncommitted amounts should be returned to the GEF Trust Fund. This is not a physical transfer of money, but achieved through reporting and netting out from disbursement request to Trustee. Please indicate expected date of refund transaction to Trustee.

ANNEX E: CALENDAR OF EXPECTED REFLOWS (if non-grant instrument is used)

Provide a calendar of expected reflows to the GEF/LDCF/SCCF/NPIF Trust Fund or to your Agency (and/or revolving fund that will be set up)

ANNEX C.2: ADDITIONAL CONSULTANTS TO BE HIRED FOR THE PROJECT USING THE GEF-SCCF RESOURCES

Position Title	\$ / Person Months	Estimated Person Months	Tasks to be Performed
For Technical Assistance			
Local Consultants			
Coastal Ecologist	5909	4	<ul style="list-style-type: none"> • To assess potential ecological effects of climate change on the coast with special reference to impacts of climate change on mangrove, dunes and coral reefs and the resulting effects on coastal erosion and instabilities. • To review ongoing mangrove research and propose strategies to increase the sustainability of mangrove under changing climatic conditions. • To work with data management specialist to source GIS mapping mangrove and coral reefs for the Indian coast • To advise on appropriate types of dune vegetation to be incorporated into the pilot projects • To support the development of adaptation guidelines in relation to ecological coastal protection
Data Management GIS Specialist	5909	4	<ul style="list-style-type: none"> • To work with the TA consultants and the research institutes to prepare the design of a coastal climate change information system. • To work with the SCPMIP consultants to assess how the outputs of the TA studies can be incorporated into the coastal data management system. • To liaise with CWC and the MoEF and other organisations who have established or proposed data management systems. Review the various systems and assess how a common data system could evolve. • Design the framework and metadata for a coastal climate change data system. • To work with a GIS technician to be recruited and prepare the GIS coastal climate change information system and prepare modules for training. • To support the preparation of the adaptation guidelines, modules for training and awareness materials.
Specific Climate Studies to be Contracted to National Research Institutes -Indicative scope of work			
Downscaled climate change projections of temperature, wind and rainfall	5909	5	<ul style="list-style-type: none"> • Provision of downscaled projections for wind, extreme wind events, temperature and rainfall for the Indian coast. Through analysis of multiple models levels of uncertainty of the projections would also be prepared. • Output: Downscaled climate projection matrixes for the Indian coast.
Historic trends in sea levels	5909	2	<ul style="list-style-type: none"> • Compilation of tidal monitoring, quality control, trend analysis. • Output: preparation of a database of historic sea level changes for Indian Coast
Projections of sea level rise from climate change	5909	3.32	<ul style="list-style-type: none"> • Review of research into global sea level change • Apply downscaling and provide corrections to the Indian coast and linkages to historic trends of sea level change. • Develop probability of different scenarios. • Output: Preparation of a downscaled database of projected sea level changes including probabilities.
Analysis of Vertical land movements	5909	5	<ul style="list-style-type: none"> • Collect and compile latest information and research on isostatic and local land settlement changes with particular reference to tidal stations and areas with pronounced level changes. • Output: preparation of a database of showing future vertical changes in land
Analysis of changes in wave characteristics	5909	5.15	<ul style="list-style-type: none"> • Analysis of changes in wave characteristics for the Indian coast based on the IITM wind projections. • Analysis of the changes in frequency and intensities of storms based on

Position Title	\$ / Person Months	Estimated Person Months	Tasks to be Performed
from climate change			IITM wind projections <ul style="list-style-type: none"> • Output: A database and GIS of the Indian coast showing changes in predominant and storm wave characteristics.
Analysis of projected changes in storm surges	5909	10	<ul style="list-style-type: none"> • Analysis of current and projected storm surges for the Indian Coast using the downscaled projections for extreme wind and pressure information. • Coastal vulnerabilities are being assessed by the MoEF CZM project and not proposed for the GEF-SCCF project.
Independent Advisory Panel of experts			
Independent Advisory Panel of Experts: 16 experts (1 from each of the 12 maritime states and union territories and 4 national experts).	7000	8 person months (each expert 2.2pw input)	<ul style="list-style-type: none"> • To undertake a peer review of guidelines for coastal climate change adaptation • To help define specific issues and adaptation measures relevant to each coastal state union territory.
International Consultants			
Coastal Morphologist/beach management specialist	25000	2.5	<ul style="list-style-type: none"> • To review outputs of shoreline management plans in the two focal states and other parts of the Indian Coast with special reference to morphological impacts of climate change on the equilibrium of beaches and coastal wetlands (mud flats). • To undertake more detailed analysis of not less than five case studies, to assess the current issues of instability and the potential future impacts of climate change. • Present proposals and outline designs and specification to support stabilization of beaches and coastal wetlands under scenarios of climate change • To prepare strategies and outline approaches for pilot community projects • To support selection of pilot sub projects locations • To support the preparation of the adaptation guidelines, modules for training and awareness materials.
Institutional/training specialist	25000	2	<ul style="list-style-type: none"> • To review the institutional base for coastal protection and management and climate change adaptation • Identify the institutional and capacity constraints for adaptation to coastal climate change adaptation. • Develop strategies to support training and awareness • To prepare the approach and details for an integrated program of training and awareness under the TA including the adaptation guidelines, training of trainers, modules for training courses and the design of the awareness campaign.
Project Management Costs	<ul style="list-style-type: none"> • Finance/Admin Specialist 83.6 person weeks @ \$273/week • Office costs including rental electricity, maintenance 88 weeks @\$160/week • International Travel for international consultants 14 return airfares @\$3000 per return airfare • National Travel for national and international consultants within India 155 single trips @\$120/trip • Land transport vehicle hire 94 weeks @ \$100/week 		



UNITED NATIONS ENVIRONMENT PROGRAMME

Programme des Nations Unies pour l'environnement Programa de las Naciones Unidas para el Medio Ambiente
Программа Организации Объединенных Наций по окружающей среде برنامج الأمم المتحدة للبيئة



联合国环境规划署

PROJECT DOCUMENT

SECTION 1: PROJECT IDENTIFICATION

- 1.1 **Project title:** Implementing adaptation technologies in fragile ecosystems of Djibouti's central plains.
- 1.2 **Project number:** GFL/
PMS: 891
- 1.3 **Project type:** FSP
- 1.4 **Trust Fund:** GEF
- 1.5 **Strategic objectives:** Climate Change Adaptation
- 1.6 **UNEP priority:** Climate Change Adaptation
- 1.7 **Geographical scope:** National
- 1.8 **Mode of execution:** External
- 1.9 **Project executing organization:**
- 1.10 **Duration of project:** 48 months

Commencing: 01/03/2014
Technical completion: 01/03/2018
50 months

1.11 **Validity of legal instrument:**

1.11 Cost of project		%	US\$
Cost to the GEF Trust Fund	7 360 000	34.0	
Co-financing			
Grant			
National Government	12 800 000	59.0	
UNEP-IUCN	270 000	2.0	
UNEP Food Security	600 000	3.0	
<i>Sub-total</i>	14 170 000	64.0	
In-kind			
UNEP-EC SIDS	500 000	2.0	
<i>Sub-total</i>	500 000	2.0	
Total	21 530 000	100	

Project Summary

Djibouti is vulnerable to climate change-induced hazards such as floods, droughts and sea-level rise (SLR). These hazards result in: i) erratic and limited water availability; ii) poor water quality; iii) considerable soil erosion; and iv) damages to infrastructure. The impacts of these hazards are particularly detrimental to Djibouti's water, agriculture and health sectors. The aridity of Djibouti results in its water sector having limited capacity to meet the requirements of the country. Predicted climate changes of a reduction in total rainfall, combined with increased inter-annual variability of rainfall, will further limit this capacity. In addition, damage to water infrastructure from flooding will constrain the water sector. Because most farmers do not have irrigation systems and rely on rainfall, Djibouti's national water insecurity greatly reduces agricultural productivity. This is further exacerbated by soil erosion that is intensifying as a result of extreme rainfall events. Finally, public health is adversely affected by climate change because of its effects on food supplies, water quality and water supplies.

Djibouti also faces several non-climate change-related threats. Unplanned and unsustainable resource use is particularly problematic because it results in widespread degradation of ecosystems. Activities that result in ecosystem degradation include overgrazing by livestock, inappropriate agricultural practices and unsustainable rates of use of woodfuels such as charcoal and firewood. Such degradation diminishes the value of the ecosystem goods and services used by local rural communities in Djibouti. Degradation of ecosystems such as mangroves and *Acacia* woodlands results in negative effects such as increased soil erosion, desertification, sedimentation of surface waters and invasion by alien plant species. The degradation of ecosystems is exacerbated by demographic factors such as Djibouti's rapid rate of rural-urban migration and the settling of nomadic pastoralists, which further increase the localised demand for natural resources. The vulnerability of Djibouti's population to the negative effects of climate change is increased as a result of the reduced capacity of ecosystems to provide a buffer against climate-related hazards, particularly droughts, floods and erratic rainfall.

To address these problems, the proposed LDCF project will use a combination of Ecosystem-based Adaptation (EbA) and hard infrastructure interventions supported by institutional and capacity development activities to reduce the climate vulnerability of local communities living in the Hanlé Plains of Dikhil Region and in the inland plains and coast of Tadjourah Region (hereafter referred to as Hanlé and Tadjourah). These districts were identified in Djibouti's NAPA as being particularly vulnerable to climate change. The project will enhance delivery of ecosystem goods and services under conditions of climate change by: i) restoring degraded *Acacia* woodlands and mangroves; ii) using hard infrastructure to combat droughts and floods; and iii) establishing agropastoral plots to increase agricultural productivity and diversify livelihoods. Sources of finance to support and develop agropastoral value chains will be identified. The sustainability of the proposed LDCF project will be supported by training local communities on EbA and agropastoralism and encouraging ownership of the project's interventions by stakeholders. The project will introduce a diverse range of adaptation technologies including *inter alia*: i) hard infrastructure such as gabion walls and levees to reduce the severity of flooding; ii) installation and rehabilitation of boreholes, including solar-powered borehole pumps; iii) rainwater harvesting techniques such as straw mulching, *Zai* and contouring; iv) improved climate-resilient agricultural techniques such as drip irrigation and distribution of comprehensive packages of high-quality farmer input kits; and v) climate-resilient alternative livelihoods such as apiculture, aviculture and marketing of crafts.

The capacity for Djibouti to upscale EbA and other climate change adaptation interventions will be enhanced by: i) conducting research to assess mid- and long-term benefits of the project interventions; ii) training policymakers in relevant government ministries to integrate EbA into development planning; iii) implementing a campaign to increase public awareness

of school children on climate change; and iv) developing support systems to provide information on and promote EbA.

The abovementioned activities will achieve the following outcomes:

- reduced or averted negative impacts of droughts and floods;
- increased productivity and climate-resilience of ecosystems;
- diversified livelihoods that are sustainable, climate-resilient and contribute to maintenance of ecosystem services; and
- increased capacity of institutions and communities to proactively adapt to climate change.

The LDCF project will address priorities identified in Djibouti's NAPA and will build on five ongoing baseline projects, namely:

- Programme De Mobilisation Des Eaux De Surface Et De Gestion Durable Des Terres (PROMES-GDT).
- Projet de Développement Rural Communautaire et Mobilisation des Eaux (PRODERMO); and
- Projet de Développement des Palmiers Dattiers (PDPD).

This LDCF project will be implemented by UNEP. The Ministry of Habitat, Urbanism and Environment (MHUE) will execute the project in close collaboration with the Ministry of Agriculture, Livestock and Hydraulic Resources and other relevant ministries.

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ACRONYMS AND ABBREVIATIONS

AAH	Agropastoral Association of Hanlé
ADDS	Social Development Agency of Djibouti Agence Djiboutienne de Développement Social
AF	Adaptation Fund
AFF	African Forest Forum
AFDB	African Development Bank
AFSED	Arab Fund for Social and Economic Development
ANM	Agence Nationale de Météorologie
APP	Agropastoral Plot
AU	African Union
CBD	Convention for Biological Diversity
CCC	Climate Change Committee
CCD	United Nations Convention to Combat Desertification in Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa
CDNCC	Comité Directeur National des Changements Climatiques
CENSAD	Community of Sahel-Saharan States
CERD	Centre d'Etude et de Recherche de Djibouti
CRIPEN	Centre de Recherche, Information et Production de l'Education Nationale Centre of Research, Information and Production of the National Education ministry
CTA	Chief Technical Advisor
CTDD	Comité Technique pour le Développement Durable
DAF	Directorate of Agriculture and Forestry
DATE	Directorate on Land Use and the Environment/Direction de l'Aménagement du Territoire et de l'Environnement
DEPI	Department of Environmental Policy Implementation
DRH	Direction on Rural Hydraulics
DTIE	Division for Industry, Technology and Economics
EA	Executing agency
EbA	Ecosystem-based Adaptation
EIA	Environment Impact Assessments
EMINWA	Environmentally-sound Management of Inland Waters Programme
EOU	Evaluation and Oversight Unit
EU	European Union
EWS	Early Warning System
FAO	Food and Agricultural Organisation
FEM	Global Environment Fund
FFEM	Fonds Français pour l'Environnement Mondial
FIDA	International Fund for Agriculture Development/ Fond International pour le Développement de l'Agriculture
GDP	Gross Domestic Product
GEF	Global Environmental Facility
GFDRR	Global Facility For Disaster Reduction and Recovery
GGW	Great Green Wall
IA	Implementing Agency
IC	International Consultant
IDA	International Development Association

IDB	Islamic Development Bank
IGAD	Inter-governmental Authority on Development
INC	Initial National
INDS	National Main Development Policy
IUCN	International Union for the Conservation of Nature
IWRM	Integrated Water Resources Management
LCE	National Law on Environment
LDCF	Least Developed Countries Fund
M&E	Monitoring and Evaluation
MAPE-RH	Ministry of Agriculture, Fisheries, Livestock and Hydraulic Resources/Ministère de l'Agriculture, de la Pêche et de l'Élevage chargé des Ressources Hydrauliques
MDG	Millennium Development Goals
MESDAP	Surface Water Recharge for Agropastoral Development Programme
MHUE	Ministry of Habitat, Urbanism and Environment / Ministère de l'Habitat, de l'Urbanisme, de l'Environnement et de l'Aménagement du Territoire
MPA	Marine Protected Areas
NAPA	National Action Plan for the Environment
NDRAMS	Natural Disaster Risk Assessment and Monitoring System
NEA	National Executing Agency
NGO	Non-Governmental Organisation
NLE	National Law on Environment/Loi cadre sur l'Environnement
NTA	National Technical Assistants
NTFP	Non-timber forest products
OCHA	Coordination of Humanitarian Affairs
ONT	Office National de Tourisme
PDPD	Projet de Développement des Palmiers Dattiers
PERSGA	Regional Organization for the Conservation of the Environment of the Red Sea and Gulf of Aden
PIP	Public Investment Programme
PIR	Project Implementation Review
PM	Project Manager
PMCWG	Project Managers Coordination Working Group
PMF UNDP-GEF	Associé au Programme de Petites Subventions – Fonds pour l'Environnement Mondial
PMU	Project Management Unit
PNDS	National Programme for Sanitary Development
PNLD	National Programme against Desertification/ Programme National de Lutte contre la Diversification
PNSA	National Food Security Programme
PRODERMO	Projet de Développement Rural Communautaire et Mobilisation des Eaux
PROMES-GDT	Programme De Mobilisation Des Eaux De Surface Et De Gestion Durable Des Terres
PROVIA	Programme of Research on Climate Change Vulnerability, Impacts and Adaptation
PRSP	Poverty Reduction Strategy Paper
PSC	Project Steering Committee
PSSA	Special Programme for Food Security
RHT	Rainwater Harvesting Technologies

RLACC	Rural Livelihoods Adaptation to Climate Change in the Horn of Africa
SNIFD	National Policy for the Integration of Women into Development/ Politique Nationale pour matière d'intégration de la femme dans le développement
SMART	Specific, measurable, achievable, relevant and timebound
TCP	Technical Cooperation Programme
TM	Task Manager
ToR	Terms of Reference
UN	United Nations
UNDAF	United Nations Development Assistance Framework
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Convention on Climate Change
UNICEF	United Nations Children's Fund
WB	World Bank
WFP	World Food Programme

SECTION 2: BACKGROUND AND SITUATION ANALYSIS (BASELINE COURSE OF ACTION)

2.1. Background and context

1. This proposal seeks funding from the Least Developed Countries Fund (LDCF) to implement the Full-Size Project (FSP) “Implementing adaptation technologies in fragile ecosystems of Djibouti’s central plains”, hereafter referred to in this document as “the LDCF project”. The objective of the LDCF project is to reduce the vulnerability of ecosystems and local communities to the effects of climate change. In particular, the interventions proposed in this LDCF project will reduce the effects of climate-related hazards including prolonged droughts and extreme erratic rainfall. To reach this objective, the following interventions are designed within the proposed LDCF project. These include: i) constructing hard infrastructure to protect local communities against flooding; ii) restoring ecosystems to increase their resilience to climate-related hazards; iii) promoting sustainable and climate-resilient livelihoods; and iv) strengthening the capacity of Djibouti to undertake, monitor and plan appropriate interventions to buffer climate-related effects. These project interventions are a hybrid approach to climate change adaptation, including both the Ecosystem-based Adaptation (EbA) approach advocated by UNEP combined with a conventional infrastructure-based approach.

2. The proposed LDCF project will pilot small-scale interventions in mangrove and *Acacia* woodland ecosystems. The two areas of Djibouti which have been selected for on-the-ground project interventions are: i) the Hanlé Plains in Dikhil Region, hereafter referred to as Hanlé; and ii) the coastal and inland plains of Tadjourah Region, hereafter referred to as Tadjourah. The locations of these project areas are shown in Figure 1. These areas are of strategic importance for the development of Djibouti owing to the growing economic and agricultural activities. They are also identified in Djibouti’s National Adaptation Plan of Action (NAPA) as two of the most vulnerable areas to climate change.

3. The proposed LDCF project will address the following priorities identified in the NAPA.

- “Mitigation of climate change-related risks for the production system of coastal areas through an integrated, adapted and participatory management involving grassroots organisations”. This priority is ranked as the 1st order cross-sectoral priority.
- “Promotion of the integrated agropastoral industry and the development of irrigation techniques to control the salinisation of soils”. This is ranked as the 5th order cross-sectoral priority.
- “Improvement of rangeland management to mitigate the risks associated with the traditional extensive livestock”. This is ranked as the 5th order priority in the food security sector.
- “Restoration of protected sites through the protection of coral reefs and mangrove vegetation”. This is the 7th order priority in the coastal zone and marine ecosystem sector.
- “Implementation of restoration and management actions adapted to surface water”. This last priority taken into account in the proposed LDCF project is the 3rd order priority in the water resources sector.

Geographical context

4. Djibouti is located in the Northeast part of Africa between 10°09’N and 12°07’N latitude and between 41°08’E and 43°04’E longitude (Figure 2). It has 314 km of coastline and shares borders with Eritrea, Ethiopia and Somalia. The country is mainly a stony semi-

desert, with scattered plateaus and highlands. The land and maritime surface areas¹ of Djibouti cover 23,000 km² and 7,190 km², respectively.

5. The population of Djibouti is estimated to be approximately to 1 million, of which 6.1% are refugees. Human population growth rate approximates 4.8% per annum. More than 80% of the population lives in urban areas, with 58.1% in the capital city.



Figure 1: Political map of Djibouti. The proposed project intervention areas are indicated by red circles. The intervention areas of the previous LDCF 1 project are indicated by green circles.

¹ Poverty Reduction Strategy Paper and Djibouti National Office on Statistics (DISED). 2009.

Political context

6. During the last decade, Djibouti has been a politically stable in a conflict-prone region (Figure 2). It is a democratic country with regular elections. However, the political opposition in Djibouti is fragmented and often boycotts elections. Owing to its political stability, Djibouti constitutes an “island of peace” that attracts many asylum seekers. The location of Djibouti at the confluence of Africa and the Gulf countries makes it the main route for mixed migratory movements toward Yemen and beyond. Armed conflict, insecurity and violence, compounded by droughts and limited economic conditions across the region, have compelled people to seek asylum in Djibouti². There are regular arrivals of refugees, particularly from south-central Somalia in the country. Djibouti is also a hub for international naval forces combating piracy in one of the world's busiest shipping routes stretching from the Gulf of Aden to the Indian Ocean.

7. The political stability of the country is also translated into the excellent relationships and prominent roles Djibouti plays in stabilising its neighboring countries. For example, Djibouti developed and maintains excellent relations with Ethiopia. In addition, it played a significant role in resolving Somalia long-standing conflict. Djibouti's commitment for peace in Somalia has led to the Djibouti Agreements of August and December 2008 that resulted in the establishment of the Transitional Federal Government of Somalia. The only regional conflict that may be problematic to Djibouti has already been resolved owing to the mediation of Qatar. This conflict concerns the delimitation of its border with Eritrea.

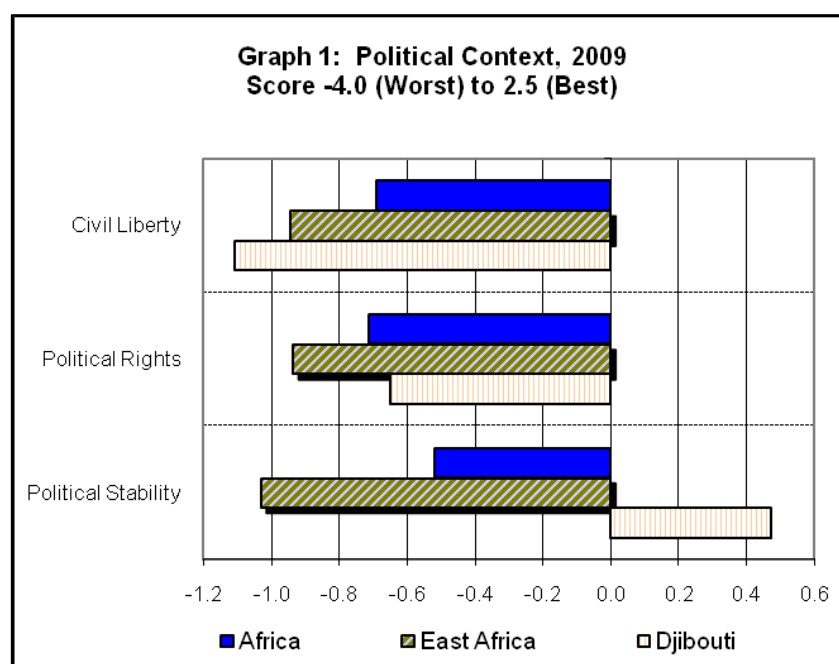


Figure 2. Measuring political stability of Djibouti within East African and African context.
Source: AFAB Statistics Department using data from the WEF, 2010.

Socio-economic climate

8. Nearly two-thirds of the population resides in or around the capital city. Approximately 42% of the total population lives in extreme poverty, whereas 75% live in relative poverty. In rural areas, 96.7% of people are relatively poor and suffer from chronic

² <http://www.unhcr.org/pages/49e483836.html> [accessed 22 September 2013].

food insecurity³. Rural populations, estimated to be approximately 150,000 people, are semi-nomadic or nomadic pastoralists living in isolated villages. Unemployment affects around 60% of the active population. The composite index of human poverty in Djibouti is estimated to 42.5%. This index is close to that of the extreme poverty (45%), indicating that poverty has become a structural problem in the country.

9. Djibouti is a low-income and food-deficit country. It has some of the lowest health, education and other social indicators in the world. For example, according to the 2010 UN Human Development Index, the country was ranked 147th out of 169 countries. The economy of Djibouti is characterised by: i) a commercial urban sector, modern and oriented towards exports; and ii) a rural sector, dominated by subsistence economy based on pastoralism, with limited access to infrastructure, services and markets.

10. The service sector⁴ contributes to 77% of Djibouti's GDP (Figure 3). This sector employs 60% of the working population. Agriculture contributes only to 4% whereas the industrial and manufacturing sectors account for 19% of GDP. Although the economic growth has been strong during the last 10 years, it has very little impact on rural communities. Their living conditions have been exacerbated by repeated droughts and erratic rainfall. The per capita income has fallen by over 25% compared to its 1984 level, while the deficit of state budget reached 10.1% of GDP in 1995.

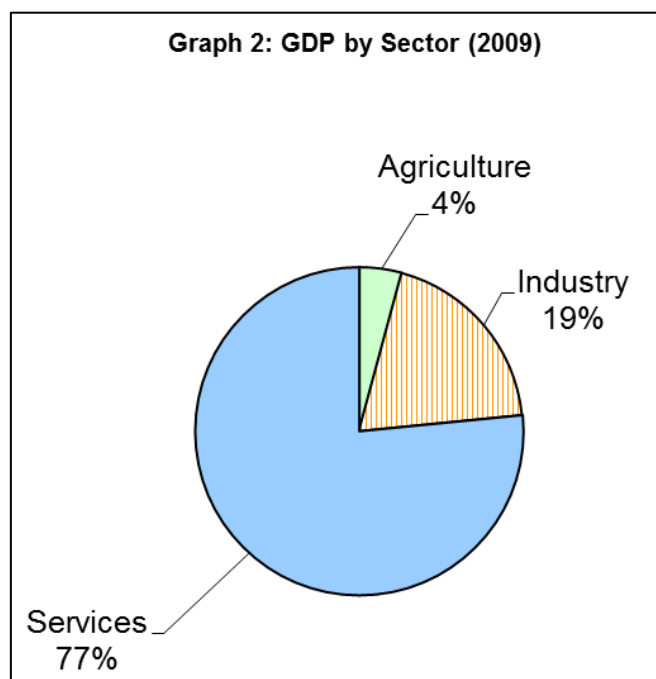


Figure 3. Contribution of economic main sectors to GDP in Djibouti. Source: AFAB Statistics Department.

11. Since 2003, Djibouti has been receiving a massive influx of foreign direct investments (FDI) mainly from the Gulf States. The FDI is part of a long-term strategy of the government to transform Djibouti into a regional platform for commercial, logistics and financial services. Over the past few years, the FDI has helped the government to maintain a positive capital account balance, which contributed to a surplus balance of payments amounting to US\$ 9 million in 2009 and 2010.

³ UN World Food Programme, Emergency Food Security Assessment, Djibouti, 2009

⁴ Service sector includes transport, communication, trade, tourism and banking activities.

12. The real growth rate of the GDP was sustained during the 2007-2010 period, averaging 5% per year. This growth was the result of increased port activities and FDI flows into the country (Figure 4).

13. Inflation remains sensitive to rising prices of food and oil products, which are the country's main imports. The rate of inflation has increased to 3.9% as a result of rising food prices. Consequently, the government is subsidising food and oil prices to mitigate the effects of inflation.

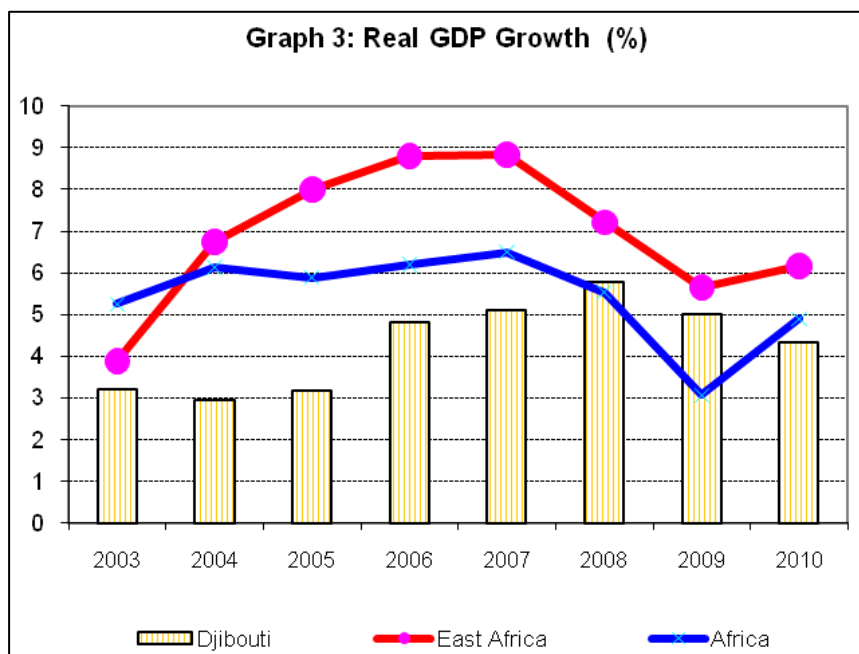


Figure 4. Comparative analysis of Djibouti's GDP growth rate in relation to the regional and continental figures. Source: AFAB Statistics Department, African Economic Outlook, April 2011.

Education

14. The government is making important progress in the education sector. For example, the enrolment rate of students has increased from 39% in 2000 to 74% in 2009. The ratio girl/boy among enrolled students also increased from 0.8 in 2001 to 0.89 in 2009. Such increase resulted in an improvement of the literacy rate in the 15-24 age group, reaching 79% in 2009 against 46% in 2002. In 2010, the literacy rate of women is estimated to 47% among women aged 15 to 49. However, the major challenges in education sector in Djibouti remains: i) a low percentage of completion in primary school; ii) high rates of teacher absenteeism; and iii) overcrowded classrooms.

15. By 2015, the government expects to achieve the Millennium Development Goal 2 (MDG 2) on universal primary education. In additional MDG goals that are achievable during the same period include the MDG 3 (Promotion of gender equality) and MDG 4 (Reduction of child mortality). However, achieving MDG 1 (Eradication of extreme poverty and hunger) within the same timeframe is unlikely⁵.

Agriculture

16. Djibouti's agriculture sector remains under-developed. It is characterised by a low level of productivity and makes a minor contribution to the domestic food supply. The

⁵ African Development Bank Group. 2011. Djibouti: Country Strategy Paper, 2011-2015.

National Strategy for Food and Nutrition Security (2008) estimates that less than 10% of the calories consumed nationally come from domestic production. The remaining 90% is imported from the international market. This dependence on regional or international food imports – which applies in both rural and urban areas – results in vulnerability to changes in external market prices.

17. The small contribution of the agricultural sector to GDP (Figure 3) is directly related to Djibouti's general aridity and the effects of climate change. It also results from Djibouti's relatively minor investment in modern farming technologies. Water resource mobilisation and management investments including rainwater harvesting, construction of boreholes and recharge of aquifers are particularly limited.

18. As a result of increased urbanisation, the government has prioritised the development of the services sector. The objective is to position Djibouti as a strategic transit hub that offers commercial access to the sea to neighbouring landlocked countries. Consequently, agriculture and rural development are often overlooked by government for investment. As such, agricultural productivity over the past few decades has been relatively stagnant and in some regions even declined owing to recent dry conditions. Notwithstanding the under-developed state of the agricultural sector in Djibouti, agricultural activities do play an important role in the food supply and daily subsistence of rural communities in particular because of their extreme poverty and limited income opportunities. Agriculture consequently provides the primary means of livelihoods for a vast majority of households in rural Djibouti.

19. In rural areas, two traditional production systems are present: pastoralism and small-scale farming. Pastoralism is a deeply entrenched tradition that dominates Djibouti's rural economy. Indeed, ~90% of Djibouti is classified as 'pastoral' i.e. lands that are used for herding. Nomadic herding is a highly efficient way of managing the sparse vegetation and relatively low soil fertility of Djibouti. Most of the herding in Djibouti is consequently 'nomadic'. Indeed, such herding is often the only source of subsistence for Djibouti's pastoral communities which comprise ~210,000 people. The national livestock herd managed by these communities is estimated to be more than 1 million animals. Of these, ~90% are either sheep or goats. The grazing routes the pastoralists use for these animals are chosen in any particular year by the presence of water and pasture.

20. Small-scale farming is a relatively recent activity in Djibouti compared with extensive pastoralism. Despite some uptake during recent decades, small-scale farming remains under-developed in the country. This is the result of limited access to reliable water resources in most rural areas. Arable land in Djibouti amounts to 2,000 hectares⁶. The farmer community is estimated to comprise 30,000 people. Most of the cultivation takes place in small agricultural plots generally located on wadis' banks. Most farmers are involved in fruit and vegetable production, sometimes combined with semi-sedentary livestock production such as sheep, goats and camels. In these agropastoral systems, animals usually graze in the nearby rangelands during the rare summer rainy periods known as the "Karan/Karma" rain. They also receive supplementary forage from cereal residues such as corn or wheat bran. In past years, the government started to diversify local agricultural production by introducing agro-forestry practices through drought and salt-tolerant varieties of date palms imported from Saudi Arabia.

21. Pastoral communities in Djibouti have been increasingly affected by desertification and more frequent droughts in recent decades. The associated declining pastoral resources, coupled with population growth have rendered access to natural forage more difficult,

⁶ The World Bank, 2013. <http://data.worldbank.org/indicator/AG.LND.ARBL.ZS> [Accessed 23-09-2013]

leading to loss of livestock. Moreover, government policies that have constrained herd mobility and promoted sedentary – as opposed to nomadic lifestyles – have been introduced. The government's rationale for this it is too costly to deliver satisfactory development services such as health and education to mobile pastoralists. In response to this government initiative, many nomadic communities have settled around relatively reliable water sources. These communities are as a result now exerting intense pressure through overgrazing on the water resource and adjacent rangeland ecosystems. The result is a continuous cycle of vegetation and soil degradation.

22. Prolonged droughts are also causing an increase in the salinity of groundwater used for irrigation. This results in marked declines in agricultural productivity. As a result government has implemented new projects to diversify agricultural production through drought and salt-tolerant plants such as date palms. These initiatives have been undermined by the poor genetic quality of the plants used. To date, varieties of low productivity and an excessive proportion of male trees have been used. These constraints have been exacerbated by an increase in the frequency of floods and the intensity of water flow in wadis. This has resulted in extensive bank erosion.

Energy sector

23. Djibouti's power sector is dominated by electrical power generation⁷. Electricity is, however, only available to 28% of households⁸. Indeed, the majority of households in Djibouti depend on kerosene as a source of energy (51%)⁹, while biomass in the form of wood (10%) and charcoal (10%) constitute the remainder of household energy consumption. As of 2003, Djibouti had no proven reserves of oil, natural gas and coal. It also had no refining capacity, with all petroleum products being imported¹⁰.

24. The energy sector is a strategic priority for the country. This is because recent economic growth and rapid urbanisation have increased the demand for energy considerably¹¹. As a result Djibouti has made an agreement with Ethiopia for a second power interconnection¹². This 230kV transmission line running from Semera in Ethiopia's Afar region to Jaban in Djibouti will allow Djibouti to import between 35MW and 70MW¹³.

25. Djibouti also has a wide range of renewable energy options (including geothermal electricity¹⁴), and the government is promoting private sector investment to use this potential. To this end, an in-depth study on the potential of reducing electricity costs and the politics of

⁷ According to an August 2003 Energy Information Administration analysis brief, Djibouti has an installed electrical power generating capacity of 85 MW. This is generated from an oil powered station in the Djibouti Ville.

⁸ with a further 1% using butane gas as their primary energy source

⁹ http://www.djiboutinvest.com/index.php?option=com_content&view=article&id=254&Itemid=615 [accessed 22 September 2013].

¹⁰ The port in Djibouti Ville is the main oil shipment and storage site. In 2002, imports of refined petroleum products totalled 11,410 barrels per day (1,814 m³/d), with consumption placed at 11,400 barrels per day (1,810 m³/d). There were no natural gas imports for that year.

¹¹ http://www.djiboutinvest.com/index.php?option=com_content&view=article&id=254&Itemid=615 [accessed 22 September 2013].

¹² The existing 230kV line was commissioned in 2011 and supplies around 35MW.

¹³ Yet, Djibouti is not expected to take more than 50MW according to Ethiopia's Ministry of Foreign Affairs. (Bekwet, A., Addis Fortune, 2013., *New Agreement Enhances Ethio-Djibouti Power Exchange.*, Vol 14, No, 688, July 7, <http://addisfortune.net/articles/new-agreement-enhances-ethio-djibouti-power-exchange/> [accessed 2013-09-23]

¹⁴ The AfDB's geothermal programme was initiated in the mid-2000s, and private sector developers are showing interest in expanding the 400MW Menengai geothermal complex in Kenya. See <http://www.africa-energy.com/djibouti?type=articles> [accessed 22 September 2013].

energy access has recently been conducted. Recommendations emerging from the study include the need to reform the energy sector and establish a Department of Rural Electricity Management within the Ministry of Energy.

Water resources

26. Two thirds of the Djibouti is classified as eremitic¹⁵ or hyperarid^{16,17}. Water availability is, consequently the major constraining factor for Djibouti's economy. Because the country has no permanent surface water bodies, it relies mostly on groundwater (~95%) and on water in wadis immediately after rains. Evaporation exceeds 2000 mm annually, which is ten times more than the annual rainfall of 150 to 250 mm per year.

27. The hydrographic system of Djibouti is divided into two zones, one draining to the sea (45%) and one draining to the plains in the west of the country (55%). In 2011, renewable water resources (i.e. the water total available to the country) were estimated at 300 million m³/year¹⁸. However, the vast majority of this water is not available for capture and storage. The only external surface water resources (about 2 km³/year) are from the border lake Abbe in the west of the country. Although the lake inflow is fresh, the lake is saline and consequently this resource is not considered viable for economic activity.

28. The annual production of potable water in Djibouti is only 15 million m³, while demand is estimated at 30 million m³. Despite increased access to potable water in recent years, a significant proportion of the population still has inadequate access to a reliable source of potable water and is at risk to recurrent drought in the country. Furthermore, groundwater is increasingly being contaminated by saltwater intrusion as a result of SLR in coastal areas.

29. Total renewable groundwater resources in the Djibouti district are estimated at between 10 and 21 million m³/year. In 1985, total water withdrawal was 7.5 million m³, of which about 6.5 million m³ was for agricultural purposes¹⁹ (Figure 6). Groundwater recharge is limited to the infiltration of water in the wadis and is closely linked to: i) the frequency of floods; ii) the infiltration conditions in the wadis; iii) the hydraulic contact with the substratum; and iv) the permeability of the substratum. The groundwater resources in Djibouti are particularly difficult to prospect and extract. Sedimentary formations, which are suitable for easy extraction, represent only 10% of the total area of the country. The remainder consists of volcanic rock formations. Furthermore, the groundwater often has high levels of salinity. When used for irrigation, this leads to salinisation of the surface soil. Only in the north-western part of the country is the salt content of groundwater below the acceptable limit for irrigation purposes. Alluvial groundwater is closer to the surface and is found in permeable substrates. This resource can be used for small-scale irrigation. Yet, in certain places this also has high salt content. High boron content, which impacts negatively on agricultural production, also occurs in some places.

¹⁵ Less than 50 mm of precipitation per year

¹⁶ Between 50 and 100 mm of precipitation per year

¹⁷ Le Houérou, H. N. (1996) Climate change, drought and diversification. *Journal of Arid Environments*, 34, 133-185

¹⁸ <https://www.cia.gov/library/publications/the-world-factbook/fields/2201.html> [Accessed 22-09-2013] This entry provides the long-term average water availability for a country of precipitation, recharged ground water, and surface inflows from surrounding countries. The values have been adjusted to account for overlap resulting from surface flow recharge of groundwater sources. This value does not include water resource totals that have been reserved for upstream or downstream countries through international agreements.

¹⁹ <http://www.fao.org/docrep/w4356e/w4356e0b.HTM>

30. The supply of water to rural communities for domestic and agricultural use is a primary concern for the government of Djibouti. Pilot projects have, for example, been initiated with the support of the AfDB under the Surface Water Mobilisation Studies Project. New wells, boreholes, water points and pipelines for drinking and irrigation waters are also being constructed by the European Commission, the World Bank and IFAD. Most of this investment in the water sector is focused on ensuring adequate water supply to the more densely populated coastal area. Investments in the western and central parts of the country are much less concentrated. Indeed, much of the water infrastructure in these latter areas is degraded or operating with outdated equipment.

31. Despite the investments in water infrastructure, there is uncertainty regarding future water availability because few of these investments are taking climate change into consideration. Investments in Hanlé in particular have a high degree of uncertainty. Additionally, there are significant gaps in the knowledge of national groundwater availability and quality. This constrains strategic planning at a national level in terms of using groundwater as a means of adapting to climate change.

Vegetation types, ecosystems, protected areas and land cover

32. Djibouti is characterised by diverse terrestrial and aquatic ecosystems²⁰ that occur within three distinct geographic areas: i) the coastal plains; ii) the volcanic plateaus in the southern and central part of the country; and iii) the mountain ranges in the north. The country's marine and terrestrial biodiversity comprise 826 species of plants and 1,417 species of animals, including *inter alia* 455 fish, 40 reptiles, 3 amphibians, 360 birds and 66 mammals²¹. Because 78% of local communities are reliant on agriculture for livelihoods, a large proportion (56%) of Djibouti's natural vegetation areas has been converted into agriculture²².

33. Shrublands, woodlands and steppes dominate the lowland ecosystems in the coastal plains and are characterised by plant species which are adapted to an arid climates, such as *Acacia* sp.²³. Vegetation types are categorised into:

- "Ethiopian xeric" grasslands and shrublands. This vegetation type is found in arid and semi-arid areas bordering the Red Sea and the Gulf of Oman.
- "Eritrean coastal desert". This is found along the northern coastline and forms the southern shore of the Bab-el-Mandeb strait which in turn forms the entrance to the Red Sea from the Gulf of Aden. This coastal area is an important habitat for birds^{24,25}. It is for this reason that Djibouti was included in the Agreement on the Conservation of African-Eurasian Migratory Waterbirds.
- Dry closed forests. These are found in the vicinity of the Goda and Mabla massifs, which have a more humid climate than the rest of Djibouti as a result of sea winds. These forests have relatively high floral diversity. According to the 2011 State of the World's

²⁰ CBD. 2012. Country Profile – Djibouti.

²¹ CBD. 2012. Country Profile – Djibouti.

²² van de Giessen, Eric. 2011. Horn of Africa – Environmental Security Assessment.

²³ CBD. 2012. Country Profile – Djibouti.

²⁴ Encyclopedia of the Earth 2012. Djibouti.

²⁵ Waterbirds in this region include: Black Stork (*Ciconia nigra*), White Stork (*Ciconia ciconia*), Little Stint (*Calidris minuta*), Kittlitz's Plover (*Charadrius pecuarius*), Common Crane (*Grus Grus*), Lesser Crested Tern (*Sterna bengalensis*), Great Crested Tern (*Sterna bergii*), Greater Flamingo (*Phoenicopterus ruber*), Lesser Flamingo (*Phoenicopterus minor*), Great White Pelican (*Pelecanus onocrotalus*), Pied Avocet (*Recurvirostra avosetta*) and Spur-winged Plover (*Vanellus spinosus*). Information obtained from: Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA). 2012. African-Eurasian Waterbird Agreement.

Forests report, only 6,000 hectares (~ 1% of Djibouti's land area) is forested²⁶. Many of the forested areas are affected by deforestation and degradation owing to overgrazing, pollution, climate change and wood extraction for firewood production.

- Mangroves. Patches of mangroves are found around the Gulf of Aden.

34. Protected ecosystems in Djibouti include the: i) Maskali and Moucha islands; ii) Haramous-Loyada wetland, designated as a Ramsar Wetland of International Importance; iii) Decan Wildlife Refuge; iv) Day Forest; v) Mabla Forest; vi) Abbe Lake; and vii) Assal Lake. The ecosystems which are considered to be threatened include mangroves, wetlands, semi-deserts and marine areas. The main direct threats to these ecosystems include overgrazing, overfishing, pollution and firewood collection²⁷. In protected areas, these threats are exacerbated by limited human resources, technical capacity and financing. Additional threats to Marine Protected Areas (Moucha and Maskali, the Gulf of Tadjourah) include maritime transport, port-related activities and other anthropogenic coastal pressures²⁸. Threats to the Haramous-Loyada wetland include expansion of the port of Djibouti, over-collection of fuelwood and overgrazing²⁹.

35. The effects of anthropogenic threats on biodiversity in Djibouti are exacerbated by climate-related hazards. For example, the country is experiencing its seventh consecutive year of drought³⁰. As a result, the area affected by desertification is expanding. The observed consequences of this desertification include a reduction in species diversity and plant biomass as well as a reduction in the overall productivity of the dryland ecosystems³¹.

Conservation

36. The government has implemented a number of initiatives to prevent the degradation of Djibouti's ecosystems. For example, in Marine Protected Areas (MPAs) only "artisanal fishing"³² for a limited number of days is allowed. In addition, coral and mollusk collection is prohibited in MPAs³³. A recent initiative for conserving terrestrial ecosystems is the Conservation Breeding Specialist Group (CBSG) – a worldwide organization which conserves threatened species. In Djibouti, CBSG interventions focus on conserving species of global, regional and national importance and their ecosystems. Their participants include: i) governmental representatives; ii) representatives from local NGOs; and iii) relevant international partners. This participation has resulted in the joint development of the first Conservation Action Plan for Selected Land Animals in Djibouti.

General climatic conditions

37. Djibouti is characterised by arid and semi-arid climates. The aridity makes the country particularly sensitive to climate-related hazards (see Section "Observed trends in climate change, climate hazards and impacts" below).

38. The general climatic figures include: i) a fluctuating, low and abrupt precipitation regime with an annual mean rainfall of 150 mm; ii) a mean annual temperature between 17°C and 42°C; iii) an extremely high rate of evapotranspiration (~2000 mm per year); and iv) a particularly hot and dry West wind regime (*Khamsin*) that results from the warming and

²⁶ FAO. 2011. State of the World's Forests.

²⁷ van de Giessen, Eric. 2011. Horn of Africa – Environmental Security Assessment.

²⁸ The Regional Organization for the Conservation of the Environment of the Red Sea and Gulf of Aden (PERSGA). 2010. The Status of Coral Reefs in the Red Sea and Gulf of Aden: 2009.

²⁹ Arab Cultural Trust. 2012. Environment: Haramous-Loyada.

³⁰ USAID. 2012. Djibouti, Biodiversity and tropical forests. 118/119 Assessment.

³¹ van de Giessen, Eric. 2011. Horn of Africa – Environmental Security Assessment.

³² Artisanal fishing" is defined as fishing using a traditional technique.

³³ Arab Cultural Trust. 2012. Environment: Haramous-Loyada.

drying of the Eastern African Monsoon (*Foehn* effect). Additionally, Djibouti experiences the “La Niña phenomenon”, which further exacerbates the effects of drought and increases food insecurity owing to the strong reliance of Djiboutians on rain-fed agriculture and pastoralism.

39. In short, the climate of Djibouti creates chronic water stress caused by strong hydrological uncertainty. Climate predictions for the Horn of Africa indicate: i) frequent extreme weather events; ii) an increase in average rainfall in the long term; and iii) increasing air temperatures. Additionally, coastal areas are predicted to experience marine acidification, warming ocean temperatures and sea level rise³⁴.

Observed trends in climate change, climate hazards and impacts

40. Since 1990, mean atmospheric temperature has increased by 1.5°C in Djibouti. By 2050, climate change scenarios predict a further increase in mean temperatures of between 1.7 to 2.1°C³⁵.

41. Recently, the frequency of prolonged and severe droughts in Djibouti has increased from one per decade to one every two to three years. During the last 35 years, there have been droughts in 1980, 1996, 2001, 2005, 2008, 2009 and 2011. The drought that occurred in the Horn of Africa between mid-2011 and mid-2012 was attributed to *La Niña* and was the most severe drought of the last 60 years³⁶. Its consequences were particularly detrimental for local communities still affected by the 2009 drought.

42. The trend in annual average precipitation in Djibouti shows a decrease by 6 to 15% between 1961 and 1990³⁷. Precipitation during this period often occurred as “extreme” rainfall events. For example, a dry period occurring between 1986 and 1988 was followed by a record 693 mm of rainfall in 1989. This included 544 mm within one month. During recent years, Djibouti has experienced delays in the onset of the rainy season. Additionally, precipitation has been approximately 75% below average³⁸. Climate change models predict a decrease of 4 to 11% in the mean national annual precipitation by 2050³⁹. This is likely to increase the severity and frequency of droughts.

43. Droughts lead to a decrease in soil carbon and a consequent deterioration of soil structure. This in turn reduces soil infiltrability that then causes an increase in rainwater run-off and an increase in flood severity.

44. By 2050, SLR on the coast of Djibouti is predicted to be between 8 and 39 cm. This will accelerate coastal erosion and increase the frequency as well as duration of coastal flooding events. Furthermore, the intrusion of saltwater into coastal aquifers will continue at an accelerated rate. With ~60% of the population already living in low-lying coastal areas, the combined effects of flooding and saltwater intrusion is likely to affect the majority of Djiboutians in the future.

45. Coral bleaching is caused by an increase in sea water temperature and solar radiation. In 1999, this phenomenon was observed off the coast of Djibouti for the first time.

³⁴ NAPA. 2006.

³⁵ NAPA. 2006.

³⁶ World Bank press release, 12 June 2012.

³⁷ These figures cover the range of regional differences.

³⁸ UNDP/Adaptation Fund, 2011. “Developing agropastoral shade gardens as an adaptation strategy for poor rural communities” p. 5.

³⁹ Djibouti Ville is however predicted to experience an increase of 3.9%. UNDP/Adaptation Fund, 2011. “Developing agropastoral shade gardens as an adaptation strategy for poor rural communities” p. 5.

Currently, 20 to 30% of Djibouti's coral reefs are affected by bleaching. These effects include reduced fish stocks and biodiversity. Bleaching is predicted to continue with the predicted rise of ocean surface temperature.

46. The recent major climate-related hazards in Djibouti and the number of affected people are summarized in Table 1 below.

Table 1. Climate-related hazards, frequency and affected populations⁴⁰.

Climate-related hazards	Date of occurrence	Size of affected communities
Floods	Feb 1978	106,000
Droughts	June 1980	145,000
Floods	March 1981	102,000
Floods	April 1989	150,000
Floods	Nov 1994	120,000
Droughts	Feb 1996	100,000
Droughts	June 2001	100,000
Floods	April 2004	100,000
Droughts	April 2005	150,000
droughts	July 2008	340,000

47. The Rapid Drought Impact Assessment⁴¹ conducted by the government of Djibouti highlighted that the 2010 drought increased the water deficit in the country. During this drought, many traditional surface and sub-surface water sources dried up, and water table levels of aquifers in many deep boreholes decreased markedly. The drought also reduced options for alternative livelihoods for ~120,000 people living in rural areas.

48. In the south-west region in Djibouti, that accounts for more than a third of all agricultural land, the number of rain-fed and irrigated cultivated plots dropped from 500 to 120 from 2007-2011⁴². In many locations, an increased frequency of droughts has also resulted in the deterioration of water quality through increased salinisation; and ii) reduction in the amount of fodder available for livestock. Consequently, pastoralist households have in many cases lost 70 to 100% of their livestock. Livestock-raising activities currently generate 20-40% of the revenues of pastoralist households. In the absence of climate-related hazards, these activities represented 60-80% of household revenues.

49. Djibouti's Initial National Communication also highlights that climate change is predicted to increase the frequency and intensity of flash floods. This, combined with more frequent dry spells, will exacerbate the vulnerability of local communities, damage infrastructure, livestock and crops. Several important flood events have already occurred between 1991 and 2004 (see Table 1), causing numerous human casualties and considerable economic losses

Effects of climate change on major sectors

50. Climate change is expected to have a negative effect on several socio-economic sectors in Djibouti. The **water sector** is expected to be among the most affected by climate

⁴⁰ EM-DAT, The OFDA/CRED International Disaster Database, Université Catholique de Louvain, Brussels – Belgium, www.em-dat.net.

⁴¹ Evaluation rapide de l'impact de la sécheresse en milieu rural (Ministry of Interior and Decentralization, March 2010).

⁴² UNDP/Adaptation Fund, 2011 "Developing agropastoral shade gardens as an adaptation strategy for poor rural communities" p. 4

change. Changes in the frequency and duration of drought will reduce the natural recharge of aquifers. As such, the availability of groundwater is expected to decrease from an estimate of 11 650 000 m³/year in 2006 to 9 880 000 m³/year in 2050 (NAPA, 2006). Similarly, the decrease in precipitation will result in reduced availability of surface water. Additionally, the quality of groundwater is likely to decrease because of lower rate of water renewal. Increased water salinity is also expected to decrease water quality.

51. Climate change is expected to have a major impact on the **agricultural sector** upon which the majority of rural people depend in Djibouti. The expected climate change will reduce agricultural production. Firstly, the depletion in groundwater will decrease the quantity of water available for irrigation. The expected changes in the water regime will increase erosion and siltation in irrigation wells and dams further reducing water availability for livestock and irrigation. Secondly, soil and water salinity are expected to increase. This will be detrimental to the species that are not salt-tolerant. Some agricultural land might have to be abandoned because of high salinity. Thirdly, increased flood frequency will raise the propensity of farm crops and infrastructure, often close to wadi beds, to be deteriorated. Lastly, droughts will decrease the availability of pasture resources and increase overgrazing. Additionally, the livestock mortality rate is also expected to increase because of droughts and higher vulnerability to diseases. Climate change is therefore expected to reduce livestock productivity.

52. The expected droughts will have a significant effect on the **health sector**. Firstly, a decrease in water availability will decrease the number of rural people with access to enough water to meet their sanitary needs. Secondly, decreased agricultural productivity will increase malnutrition within the population. Therefore, the occurrence of nutrition-related sickness is expected to increase (e.g. tuberculosis, diarrhoea, respiratory disease). Thirdly, impoverishment as a result of decreased agricultural income will lead to a decrease in households' financial investment in health care. Finally, floods will likely cause the emergence of water-related sicknesses (e.g. dermatoses, malaria, cholera).

53. The **energy sector** will likely be affected by the increased frequency of droughts. All of Djibouti's energy provisions are imported. The government wants to decrease this dependence on neighbouring countries. However, expected changes in the water regime will reduce the potential for hydro-power production. Run-off and potential dam volumes are expected to decrease. Additionally, floods and erosion are likely to damage infrastructure and increased siltation will further reduce the potential of hydro-power production.

54. The decrease in water availability will likely lead to the reduction of tree cover. Therefore the **forestry sector** will likely be affected by climate change as well. Impoverishment of pastoral and farming communities is expected to increase their reliance on natural resources. Therefore, exploitation of forests for fuelwood will potentially increase. Additionally, under the predicted climate change conditions, the diversity in tree species will decrease because of *Prosopis* invasion. This species is well adapted to arid condition and competes with indigenous species particularly in Djibouti's coastal plains, Tadjourah and Hanlé⁴³.

55. In the **environmental sector**, climate change will lead to ecosystem degradation. Firstly, coral reefs will be further degraded by increased water temperature. Secondly, mangrove ecosystem will likely be further degraded by overgrazing and exploitation by local communities. Both coral and mangrove degradation are expected to lead to a decrease in fish diversity and abundance. Furthermore, drought, overgrazing and invasive plant species are expected to lead to a significant loss in terrestrial biodiversity.

⁴³ NAPA, 2006.

56. An increase in the frequency and intensity of floods combined with an increase in the frequency of droughts will lead to economic losses. As observed with the previous flood events, flooding causes loss of infrastructure across sectors. This will include the destruction of transport infrastructure that is already limited in Djibouti. As an example, the flood of 2004 caused the loss of USD 11.3 million through the destruction of infrastructures. An increased occurrence of floods will thus have a major impact on the economy of the country.

Problems to be addressed by the project

57. The principal problems to be addressed by the project are: i) the severe effect of climate change on the water sector as well as key sectors that depend on regular water supply; and ii) the present, limited technical capacity, management capacity, financial resources and knowledge on climate change of local communities and government to overcome and withstand the effects of climate change.

2.2. Global significance

58. Though LDCF projects are not required to comply with the global significance criteria, this project contributes towards global benefits. Djibouti forms part of the Horn of Africa biodiversity hotspot. Despite its arid climate, Djibouti's biodiversity is rich. Many threatened species of birds and some mammals are found in the country. These include the eastern imperial eagle (*Aquila heliaca*), the hooded vulture (*Necrosyrtes monachus*), the large-eared free-tailed Bat (*Otomops martiensseni*), and Soemmerring's Gazelle (*Gazella soemmerringii*). This biodiversity is present within the three diverse landscapes of Djibouti, namely: i) mountain forests; ii) plateaus and hills; and iii) transition zones at low altitudes. Each of these landscapes is represented in the projects' study sites. By restoring the ecological health in the study sites, the project increases the availability of natural habitat for the species that depends on these ecosystems.

59. The first study site, Tadjourah district, contains the sole protected area of the country, the Day Forest National Park, which is 13,900 ha. It is the main habitat of the Djibouti francolin (*Pternistis ochropectus*) classified as critically endangered and a recently discovered snake species (*Platyceps afarensis*). Both are endemic to Djibouti. In addition there are many tree species, such as acacia, wild olive and the rare giant juniper in the protected area. Moreover, Tadjourah coasts have remarkable diversity of coral species and mangroves. These ecosystems provide a habitat for 455 fish species. The fisheries provide a source of livelihoods for the local communities. However, local communities' over-extraction of the natural resources from these ecosystems has caused degradation. This project will create climate-resilient alternative economic activities for the local communities and this will reduce their reliance on these natural resources. Therefore, the project will reduce the degradation pressure on the fauna and flora in these ecosystems and help to conserve biological diversity.

60. Many flora species will be planted as part of habitat restoration activities. This will include planting diverse tree species in mangroves, acacia forests and agropastoral plots. In addition to being climate-resilient (Appendix 9), these species will be selected according to several criteria including their carbon sequestration rates. This will further increase the project contribution to adaptation to climate change.

2.3. Threats, root causes and barrier analysis

61. The principal problems to be addressed by the proposed LDCF project are: i) climate change in Djibouti will severely impact the water and agricultural sectors, thereby negatively affecting the livelihoods of local communities; and ii) local communities and all

levels of government have limited climate change knowledge, technical capacity, institutional capacity and financial resources to adapt to climate change.

62. The baseline context underpinning the climate change-induced problem is described in Section 2.6. Additionally, the climate change-induced causes and threats have been detailed in Section 2.1. The main non-climate change related threats which are found to be the root causes of the problem that the project seeks to address are described below.

Non-climate change related threats

Unsustainable resource usage and degradation of ecosystems

63. Decades of unsustainable resource use in Djibouti, particularly through the harvesting of woody plants for fuel, have resulted in a considerable degradation of natural resources and ecosystems across much of the country. Ecosystem degradation was identified as a major barrier to effective climate change adaptation in Djibouti's NAPA. In Tadjourah, mangrove stands have almost completely disappeared, leaving the coastal area bare and subject to erosion. Grazing of mangrove areas by livestock, particularly camels, is a significant cause of mangrove degradation and also limits the efficacy of mangrove restoration initiatives. The recovery of mangrove areas is also negatively impacted by sedimentation and other alterations to tidal patterns of water flow in mangrove areas. The disappearance of the mangrove buffer zone has also increased the vulnerability of coastal infrastructure and communities to storm surges, floods and saltwater intrusion. Vegetative cover in the central plains, including Hanlé, has also been reduced. This degradation is exacerbated by the population's high dependence on rain-fed agriculture, which results in additional demands on natural ecosystems for food provision during years of poor rainfall. The constant degradation of ecosystems and reduction in vegetation cover has resulted in: i) increased soil erosion; ii) a reduction in the availability of food; and iii) reduced water infiltration leading to increased flooding.

i) Threats causing erosion

64. The chain of causal events that link deforestation and degradation to erosion is detailed below.

- The cover of trees, grasses and shrubs is reduced by harvesting or grazing. As the biomass decreases, the current level of harvesting cannot be maintained. As a result, these processes become increasingly unsustainable over time, increasing the level of degradation. A negative cycle of degradation is consequently established.
- Degradation is particularly pronounced around water sources.
- The loss of vegetation cover exposes soils to raindrop impact.
- This results in clay dispersion and mineral crusting, which in turn leads to increased surface runoff and erosion. Soil infiltrability is further reduced on clayey soils through compacting by hooves of grazing animals.

ii) Threats causing a reduction in food availability

65. The chain of causal events that link deforestation and degradation to a reduction in food supplies is detailed below.

- Degradation through wood harvesting and livestock grazing results in desertification through the negative cycle described above.
- Agricultural productivity is reduced because degraded and eroded soils reduce the availability of water for agriculture. Less water infiltrates into topsoils, and it evaporates faster as a result of exposure to wind and sun.
- As agricultural yields fall, communities become increasingly dependent on ecosystem-based food supplies such as wild fruit (e.g. date palms), resin and tuber species, placing increased pressure on these resources.

iii) Threats causing a reduction in water infiltration and therefore water availability

66. The chain of causal events that link deforestation and degradation to reduced water infiltration, increased flooding and reduced water availability is detailed below.

- Reductions in vegetative cover and increased soil crusting (described above) reduce the capacity of the soil to absorb water.
- Soils retain less water during heavy rainfall, causing an increase in overland flow and an increase in wadi floods.
- Increased flow intensity also limits the replenishment of aquifers, reducing the effectiveness of boreholes and wells.
- Reduced infiltration of water into soil profiles reduces the 'sponge effect' of entire landscapes i.e. less water is stored in soils and aquifers. This results in reduced amounts of water in rivers and wadis, especially during dry periods (i.e. reduced base flow rates in wadis).

Poverty

67. Djibouti has a high prevalence of poverty (~42.5%, see Section 2.1). This situation is even worse in rural areas, with ~95% of rural people living in poverty and suffering from chronic food insecurity. The poor and marginalised in Djibouti are the most vulnerable to climate change impacts because they have the least capacity to adapt to such impacts. The majority of the rural poor population depend on agriculture, pastoralism and the use of natural resources for their livelihoods. Droughts or flooding consequently severely reduce their supplies of food.

68. Poverty in rural areas also exacerbates the unsustainable use of natural resources and further degradation of the environment. Poor communities often cannot afford to buy the additional food supplies necessary if climate-related hazards (e.g. drought) have reduced their agricultural yields. These communities therefore use surrounding ecosystems to supplement their diet and income. The resultant intensive harvesting and collection of natural resources for prolonged periods has resulted in the degradation of these ecosystems.

69. Impoverished rural communities generally have limited access to finance opportunities. As a result, households are unable to invest in opportunities which will increase their income, such as in the development of a business or purchasing high quality agricultural inputs. Consequently, the majority of rural populations are reliant on natural resource-based livelihoods such as agriculture and pastoralism. To address this issue, several initiatives have recently been implemented to increase access to microfinance (see section 2.6).

Dependence on rain-fed agriculture

70. As a result of limited surface water availability and minimal infrastructure for irrigation in Djibouti, the majority of agriculture in the country is rain-fed. This type of agriculture is disproportionately affected by water shortages associated with drought. The lack of appropriate technologies and natural buffers to reduce these adverse effects means that rain-fed agriculture contributes to the vulnerability of local communities to climate change effects.

Immigration

71. Djibouti is politically stable compared with its neighbouring countries that experience recurrent conflicts. Hence, the country is seen as a refuge for thousands of people from Ethiopia, Somalia and Eritrea. More than 20,000 refugees and asylum seekers from these neighbouring countries are expected in 2013⁴⁴. Most refugees arrive in Djibouti with few

⁴⁴ 2013 Profile of Djibouti established by the UN refugee agency (UNSCR)

possessions and little money. The high rate of immigration thus further increases poverty levels and its associated negative impacts.

Preferred responses:

72. The preferred responses to the above-mentioned climate change-induced problem and causes are detailed below. The barriers that need to be overcome in order to achieve these preferred responses are also identified. Achieving the full suite of preferred responses may not be feasible because of current constraints within Djibouti including the limited capacity and financial resources. However, by identifying and highlighting barriers to implementing these responses, the proposed LDCF project will facilitate Djibouti's development of the necessary skills and mechanisms to achieve them in the long-term.

Preferred response 1. Institutional capacity in Djibouti is strengthened to facilitate effective climate change adaptation planning and implementation to protect communities, ecosystems and economic development against negative climate change effects.

73. The preferred response is to strengthen institutional capacity in Djibouti to plan, implement and monitor appropriate approaches to climate change adaptation. This will include strengthening the capacity to introduce an EbA approach as well as hard infrastructural interventions to reduce the negative impacts of climate change. The technical capacity of relevant ministries and departments to develop appropriate climate change adaptation measures will be strengthened with extensive capacity-building and awareness-raising activities (see Section 2.5 for relevant stakeholders). In addition, measures will be introduced to support effective collaboration and information sharing between government departments to allow appropriate adaptation interventions to be planned for and developed. Increasing national capacity and the availability of knowledge on climate change impacts and potential adaptation strategies will support the replication and upscaling of successful adaptation options.

Preferred response 2. Community and local government capacity is strengthened to successfully respond to climate change threats.

74. Awareness of the potential impacts of climate change amongst local government stakeholders and local communities would be increased by this preferred response. It would also include activities to increase the awareness of communities and government stakeholders of potential options for climate change adaptation. These include both 'soft' (such as EbA) and 'hard' (such as infrastructural investments) adaptation options. The technical capacity of local communities and government stakeholders to respond and adapt to the impacts of climate change will be strengthened through capacity-building and training activities, pilot demonstrations of adaptation options, and undertaking long-term research on the impacts of pilot adaptation projects. Communities would be equipped with the appropriate hard and natural infrastructure (e.g. water supply infrastructure, drought-resilient species and flood protection infrastructure), technologies and knowledge to reduce their vulnerability to the negative impacts of climate change.

Preferred response 3. Ecosystems are restored and sustainably managed to deliver the full range of ecosystem services they are capable of delivering under future climate variability and change.

75. The preferred response is to address the unsustainable practices in natural resource management (such as over-harvesting of woodfuel, and over-grazing by livestock). This approach will be combined with conservation or restoration of degraded ecosystems using appropriate climate-resilient plant species. EbA is a preferred adaptation strategy as it can be cost-effective, generate social, economic and cultural co-benefits, and contribute to the

conservation of biodiversity⁴⁵⁴⁶. EbA measures would support the increased generation of ecosystem goods and services (e.g. flood mitigation, food provision, soil retention), thereby increasing the resilience of local communities to the effects of climate change. Furthermore, the EbA measures would be combined with hard infrastructural measures such as flood protection gabions⁴⁷, boreholes and irrigation equipment. Livelihood options based on sustainable natural resource management would be introduced in order to reduce the pressure on natural resources and provide alternatives to traditional land-use practices. These measures would generate additional beneficial ecosystem goods and services and increase household income as a result of alternative livelihood options. Consequently, the resilience of local communities to the negative impacts of climate change would increase.

Barriers to implementation of preferred solutions

Barrier 1. Limited awareness of climate change and adaptation

76. Knowledge on climate change and adaptation is limited in Djibouti, both within government institutions and local communities. This barrier was reported by multiple stakeholders during the project validation meeting (see Annex 15 for a summary of the meeting and a list of stakeholders in attendance). Within government, this is mainly a result of limited dialogue between the various ministries/departments and environment project management teams. In local communities, very few awareness-raising activities have been undertaken with respect to the impacts of climate change. The low level of education in Djibouti (see Section 2.1), complexity of information and a limited integration of climate change into the formal education curriculum also contributes to low levels of awareness about the issue. Communities therefore have limited knowledge and capacity to deal with future climate change impacts.

Barrier 2. Limited institutional and technical capacity to integrate climate change adaptation into development planning

77. Limited knowledge and awareness of climate change within government has resulted in minimal institutional and technical capacity for integrating climate change into planning. Currently, land use planning in Djibouti is undertaken in an *ad hoc* manner, with limited financial resources, and is subject to little enforcement. As a result, investments are often made by private sector partners in a manner that fails to consider climate risks. For example, schools and buildings have recently been constructed within the flood-prone area of a wadi bed in Tadjourah, leading to their immediate degradation when a severe rainfall event occurred in 2010. It is therefore not unexpected that limited institutional and technical capacity to plan appropriate interventions has been identified as a barrier to effective climate change adaptation in Djibouti's NAPA.

78. The current policy framework within Djibouti lacks the overall mechanism and tools to integrate climate resilience into land use planning, water mobilization planning and management, drought preparedness and risk reduction. Even when vulnerabilities to climate change are identified, the human and financial resources to implement adaptation interventions are often missing. Rapid building of institutional and technical capacity is therefore a prerequisite for any successful adaptation effort.

⁴⁵ Convention on Biological Diversity. 2009. Connecting Biodiversity and Climate Change Mitigation and Adaptation: Report of the Second Ad Hoc Technical Expert Group on Biodiversity and Climate Change. Montreal: Convention on Biological Diversity.

⁴⁶ Travers et al. 2012. UNEP Ecosystem-Based Adaptation Guidance: Moving from Principles to Practice (2012)

⁴⁷ Gabions have been demonstrated to be an effective method for watershed management in "Guidelines for the Integrated Management of the Watershed - Phytotechnology and Ecohydrology". Newsletter and Technical Publications. Freshwater Management Series No. 5. http://www.unep.or.jp/ietc/publications/freshwater/fms5/2/E_2-F.asp

Barrier 3. Limited knowledge of the value of ecosystems

79. There is limited understanding amongst policy- and decision-makers on the role of ecosystems in reducing the negative effects of climate change. In conjunction with constrained financial capacity, this limited understanding has resulted in few investments in ecosystem restoration by the government. Ecosystem-based adaptation (EbA) interventions, such as targeted ecosystem restoration, reduces climate change vulnerability while providing multiple benefits to society and the environment by protecting, maintaining and rehabilitating ecosystems⁴⁸. Furthermore, it has been found to be a cost-effective approach to adaptation⁴⁹. There is a need to increase knowledge and awareness in government institutions of the value of ecosystems so that EbA is integrated into climate change adaptation initiatives. **As a result of the limited investments in conservation and restoration of ecosystems, there is a lack of data to guide the development of appropriate interventions in specific ecosystems. For example, as a result of the virtual disappearance of mangroves from Djibouti's shorelines within the last 2-3 decades, there is very little information available to identify suitable sites for mangrove restoration.**

Barrier 4. Limited availability of water and technical capacity to manage water resources

80. There is a limited availability of water in Djibouti. Surface water is particularly scarce, with 95% of the water used by communities in Djibouti sourced from underground aquifers (see Section 2.1). Restricted access to water prevents the development of the agriculture sector, thereby limiting the ability of rural communities to improve their livelihoods. Furthermore, limited water supplies restrict the potential for ecosystem restoration activities.

81. Considering the scarcity of water, there is a need for comprehensive water management planning. However, limited technical capacity prevents this from being achieved in Djibouti. For instance, current information on the location of groundwater resources is limited, and restricts the ability of the government to plan and construct new water supply infrastructure. Furthermore, there is a need for increased technical capacity to manage water resources, as well as investments in water supply infrastructure. This knowledge will enable the government to select the best methods to increase water availability and implement the necessary interventions for climate change adaptation.

Overcoming barriers to implementation of preferred solutions

82. The LDCF project will contribute to overcoming the above-mentioned barriers by:

- **Improving adaptation knowledge and awareness** (to be addressed through Outcomes 2, 3 and 4). The current level of knowledge of climate change and adaptation within Djibouti is limited. The LDCF project will increase this knowledge by facilitating information gathering and exchange, and developing an online information-sharing platform. Long-term research projects established by the project, in collaboration with the University of Djibouti, will facilitate the continued generation of additional knowledge. Awareness within government structures will be increased through targeted training on climate change. In addition, the project will reconvene the currently defunct inter-ministerial Climate Change Committee. Public awareness of climate change and adaptation will be promoted through: i) campaigns in local media and at local schools; ii) learn-by-doing campaigns; and iii) access to an online information-sharing platform.

⁴⁸ Jones, H.P., D. G. Hole & E. S. Zavaleta. 2012. Harnessing nature to help people adapt to climate change. *Nature Climate Change* 2: 504-509

⁴⁹ A study in Lami Town, Fiji, found that EbA options provide a high benefit-to-cost return in terms of avoided flood damages as well as provision of secondary ecosystem services. See: A study in Lami Town, Fiji, found that EbA options provide a high benefit-to-cost return in terms of avoided flood damages as well as provision of secondary ecosystem services

- **Improving institutional and technical capacity of government.** Training of policy-makers within the MHUE and MAPE-RH will strengthen the institutional and technical capacity of national government to integrate climate change considerations into development planning (Outcome 4). Experience gained by these ministries through the implementation of the LDCF project adaptation interventions will further increase their technical capacity (Outcomes 1, 2 and 3). The LDCF project will also develop a national upscaling strategy to promote climate change adaptation across a broad range of government line ministries (Outcome 4).
- **Improving community capacity.** Training provided by the LDCF project to local communities on adaptation interventions and livelihood diversification will increase their capacity to adapt to climate change (Outcome 2, 3 and 4). The LDCF project will also establish community management committees and agropastoral cooperatives, and involve existing associations in the project training activities (Outcome 3 and 4). This will promote the sustainability of the LDCF project after the project period, and facilitate an effective “bottom-up” approach to adaptation planning. In addition, the project will conduct awareness-raising activities in vulnerable communities to improve their knowledge on climate change, **climate change adaptation and options for climate-resilient alternative livelihoods** (Outcome 2, 3 and 4). Furthermore, the LDCF project will promote community-based natural resource management, improved water management and improved farming techniques to increase the climate resilience of local communities.
- **Improved knowledge of the value of ecosystems** (to be addressed through Outcome 2 and 3). Awareness campaigns and training programmes implemented by the LDCF project will increase knowledge of both government and local communities of the adaptive benefits offered by ecosystems. This will be supplemented by experience gained through the implementation of the project’s ecosystem restoration interventions, including **restoration of Acacia** woodlands and mangroves. Furthermore, knowledge of the social and economic value of climate-resilient ecosystems will be collated, synthesised and disseminated through the online information-sharing platform established by the project.
- **Access to water and improved national and local capacity to manage water resources** (to be addressed through Outcome 1 and 3). The LDCF project will improve water supply to local communities by rehabilitating and constructing boreholes, building reservoirs and installing a water distribution network. Furthermore, local communities will be trained in low-water usage agriculture techniques, and the project will facilitate the purchase of comprehensive farmer input packages that include appropriate drip irrigation equipment. In addition to improving water supply, hydrogeological studies, grey-water usage feasibility studies and the purchase of hydrological monitoring equipment will increase the technical capacity of government to better manage water resources. This technical capacity will be further increased by the training activities implemented by the project.

For further details on the specific activities to be undertaken by the LDCF project that will contribute to overcoming the above-mentioned barriers see Section 3.3.

2.4. Institutional, sectoral and policy context

Institutional context

83. Two government ministries are responsible for developing and enforcing Djibouti's national environment policies and development strategies, namely MHUE⁵⁰ and MAPE-RH. The MHUE was established in 2000 through the promulgation of the law 82/AN/00 4/L and is responsible for the management and protection of Djibouti's environment. The mandate of MHUE is executed through the Directorate of Land Management and Environment (DATE), which is headed by the Ministry's General Secretary. DATE is responsible for the coordination and implementation of international conventions such as the Convention for Biological Diversity (CBD) and the United Nation Framework Convention on Climate Change (UNFCCC). The MAPE-RH is responsible for the primary sector and rural areas. The mandate of the MAPE-RH is executed through the Directorate of Agriculture and Forestry (DAF). DAF is responsible for the coordination of conventions such as the National Convention against Desertification. The achievement of the objectives of these line ministries is often challenged by various institutional factors such as inadequate budget allocation and limited human capacity.

Policy context

84. Djibouti has introduced multiple strategies, policies and legislation relating to environmental management and sustainable development. Relevant developments in this sector are presented below.

- The CBD was ratified on 27 August 1995.
- DATE expanded the National Environmental Action Plan in 1996.
- The National Law on Environment (LCE⁵¹) was adopted in 2000. The objectives of the LCE include the protection and restoration of the environment, including measures to limit future pollution and ecosystem degradation. The LCE also oversees the integration of environmental law into all aspects of national development, including the use of Strategic Environmental Assessments, Environmental Impact Assessments and Environmental Monitoring.
- The United Nations Convention to Combat Desertification in those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa⁵², signed in 1994 and ratified in June 1997, led to the development of the National Action Plan against desertification in 2000.
- The Strategic Action Plan of the Regional Organization for the Conservation of the Environment of the Red Sea and Gulf of Aden (PERSGA-SAP) has undertaken assessments of the status of coastal and marine ecosystem and developed National Action Plans (NAPs) for the Conservation of Mangroves, Coral Reefs, Breeding Seabirds and Marine Turtles during 2002-2005.
- DATE has executed several demonstration and on-the-ground projects in collaboration with PERSGA. This includes an integrated coastal zone management plan in Tadjourah, which addresses factors such as domestic waste management, coral reef preservation and coastal management guidelines. Additionally, DATE has undertaken mangrove restoration activities at Djibouti Ville and Khor Angar (2005) as well as various public awareness campaigns (2008-2009).
- The National Action Programme of Adaptation (NAPA) to climate change in Djibouti was finalised in 2006.

⁵⁰ Ministère de l'Habitat, de l'Urbanisme, de l'Environnement et de l'Aménagement du Territoire.

⁵¹ Loi Cadre sur l'Environnement.

⁵² Convention des Nations Unies sur la Lutte contre la Désertification dans les pays gravement touchés par la sécheresse ou la désertification, en particulier en Afrique (CCD).

- The First National Communication to the UNFCCC was developed in 2001.
- The decree defining the Environmental Impact Assessment Procedure was adopted in 2001 (decree 2001-0011/PR/MHUE) and revised in 2011 (decree 2011-029/PR/MHUE). An Environmental Impact Assessment is required for each activity considered in the decree as having a negative impact on the environment.
- The Water Master Plan⁵³ was adopted in December 1999 with the objectives of rehabilitating and developing water infrastructure. An additional objective of the Plan is to strengthening the capacity of water management institutions.

85. In Djibouti, a number of initiatives are undertaken by the government to protect the coastal and terrestrial environments. This is reflected in the number of international conventions passed by the government. Those relevant to the proposed LDCF project are presented below.

- The International convention for the prevention of pollution of the sea by oil of 1954 made applicable by Law no. 64/83 of 25 August 1983, approving the four international conventions on maritime navigation.
- The London Convention of 1971 on the international compensation fund (approved by Law 94/AN/89 2/L of 7 November 1989).
- The Brussels Convention of 1969 on Intervention on the High Seas in Cases of Oil Pollution Casualties (approved by 94/AN/89 2/L of November 1989).
- The United Nation Convention on the Law of the Sea (approved by the Law of 11 June 1985).
- The Bamako Convention on the Ban of the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa (1991).
- The Convention in International Trade in Endangered Species of Wild Fauna and Flora (1992).
- The United Nations Framework Convention on Climate Change (1992).
- The Kyoto Protocol on Climate Change (2000).

86. Djibouti is a member of several regional networks and conventions. Examples of such conventions include the 1982 Jeddah Convention, the Convention on the Conservation of Biological Diversity and the Network of Protected Areas in the Red Sea and Gulf of Aden (approved by law 137/AN/11 6/L). In addition, in 2011, Djibouti joined the convention on the establishment of the Pan-African Agency for the GGW (approved by law 133/AN/11 in 2011). This gave rise to the Inter-Ministries' committee for the Great Green Wall (decree 133/AN/11 in 2011) and the establishment of the Executive Office for the Great Green Wall project (decree 2011-036/PR/MHUE).

87. In addition to regional networks, Djibouti is member of a number of international institutions that focus on protecting environmental resources. Such institutions include United Nations Development Programme (UNDP), UNESCO (United Nations Educational, Scientific and Cultural Organization), Food and Agriculture Organisation (FAO), World Bank (WB), International Union for the Conservation of Nature (IUCN) and World Wildlife Fund (WWF). Additional institutions to which Djibouti is affiliated include African organisations such as the African Union (AU), Intergovernmental Authority on Development (IGAD), Community of Sahel-Saharan States (CENSAD) and League of Arab States.

Sectoral context

88. The National Programme for Sanitary Development (PNDS⁵⁴) was created in 2002. The first five-year programme was developed for the period 2002-2006. The second five-

⁵³ Schéma Directeur de l'Eau.

⁵⁴ Programme National de Développement Sanitaire.

year programme was based on the results of the previous programme and was implemented from 2008-2012. A programme for 2013-2017 is currently under development. The PNDS has five priorities: i) improve the organisation, management and functioning of the health system; ii) adapt the functioning and quality of health services to meet population needs; iii) adapt financial resources to the health system requirements; iv) add value to and develop human resources according to health system requirements; and v) increase availability and accessibility of quality medicine. None of these priorities promotes any activity related to management of the environment. The LDCF project will contribute to the improvement of Djibouti's health through reducing the negative impacts of climate-related hazards such as reduced water quality and availability.

89. Djibouti has adopted a National Microfinance Strategy for the period 2012-2016. This strategy has 4 main priorities: i) improving the law and policy framework; ii) increasing professionalism and structuring of micro-finance institutions; iii) increasing availability of financial resources; and iv) developing the institutional structure of the micro-finance sector. The proposed LDCF project will contribute to the development of this sector by building the capacity of local communities to use microfinance to develop agropastoralism and other livelihoods.

2.5. Stakeholder mapping and analysis

90. The proposed activities of the LDCF project have been developed through extensive consultations with national and multilateral stakeholders and have been designed to address the priority adaptation needs identified by stakeholders. This participatory approach to stakeholder engagement promotes ownership of the project by local communities. Consultations included, *inter alia*; i) the inception workshop (May 2013); ii) the validation workshop (August 2013); and iii) multiple meetings with individual stakeholders. The purpose of the stakeholder consultations was to: i) identify appropriate interventions and intervention sites based on the vulnerabilities and needs of local communities; and ii) identify government departments, agencies and ongoing projects relevant to the LDCF project activities. As a result, the proposed project will be aligned with national policy and will be feasible in the local context. The project's local stakeholders will be consulted throughout the project implementation phase. Their participation in decision-making on activities and implementation will promote local ownership and 'buy-in' of project activities for the entire implementation phase.

91. Key stakeholders include the following:

- Research and Study Centre of Djibouti;
- Directorate on Land Use and the Environment within the MHUE;
- Directorate on Rural Hydrology within the MAPE-RH;
- Directorate of Fisheries within the MAPE-RH;
- Directorate of Livestock Management within the MAPE-RH;
- National Office for Water Management and Treatment of Djibouti⁵⁵;
- **Social Development Agency of Djibouti (ADDS)**;
- Directorate of Foreign Investment, Eco-tourism and the Private Sector;
- National Meteorological Agency (ANM⁵⁶);
- Ministry of Economics;
- Risk Management Secretary within the Ministry of Interior;
- Regional government of Tadjourah, including the regional head (Prefect) and the regional advisory committee;

⁵⁵ Office national des eaux et de l'assainissement de Djibouti

⁵⁶ Agence Nationale de Météorologie

- Regional government of Hanlé, including the regional head (Prefect) and the regional advisory committee;
- Agropastoralism Association of Hanlé;
- Association of Women in Tadjourah for the promotion of crafts; and
- Approximately 250 agropastoral families (~1,500 people).

92. The proposed activities of the LDCF project have been developed through extensive consultations with national and multilateral stakeholders. Consultations included, inter alia; i) the inception workshop (May 2013); ii) the validation workshop (August 2013); and iii) multiple meetings with individual stakeholders. The purpose of the stakeholder consultations was to: i) identify appropriate interventions and intervention sites based on the vulnerabilities and needs of local communities; and ii) identify government departments, agencies and ongoing projects relevant to the LDCF project activities (see Appendices 11, 12 and 13 of the Project Document). Additionally, two national consultants conducted several field missions to meet with communities in the project intervention areas to identify priority interventions and potential beneficiaries of the LDCF project. For example, the national consultants met the farmers of the agropastoral plots in Kouidi Koma and Liliya bouri to identify the factors which limit the productivity of agropastoral plots (see Appendix 14 of the Project Document). National consultants also undertook assessments of water availability and proposed measures to increase water availability (see Appendix 15 of the Project Document). All missions to the intervention sites were conducted with the Directory of the MHUE. As a result, the proposed activities of the LDCF project are well aligned with needs identified by stakeholders and project beneficiaries. This approach will promote buy-in and participation of all project stakeholders, thereby supporting the sustainability of the project interventions. The same approach of participatory consultation will be maintained for the duration of the project implementation period. Relevant stakeholders will be consulted regularly, particularly in decisions related to the implementation of concrete, on-the-ground interventions. This approach will encourage participating communities to have a sense of ownership of the LDCF project's investments.

2.6. Baseline analysis and gaps

Baseline situation

93. *Water availability:* Several studies indicate that the climate resilience of rural and urban communities in Djibouti would be increased through measures which increase the availability of water. These studies include: i) the “Master Plan for Agriculture” report which emphasises the need to develop water access projects; ii) the evaluation report for the Mobilisation of Water for Household and Agricultural Use Project⁵⁷ which highlights the need for increased water availability for the development of agricultural activities; and iii) scientific studies conducted by CERD that demonstrate the deficit between water availability and demand. During consultations, stakeholders frequently requested that resources be allocated to increase water availability. These consultations also identified the need for improved management of water resources in the agricultural sector.

94. There are an insufficient number of boreholes, dams and reservoirs to adequately distribute water resources in Hanlé⁵⁸ and Tadjourah⁵⁹. Furthermore, the existing infrastructure is often inappropriate for local community circumstances. For example, many borehole pumps are powered by diesel generators – including at Kouidi Koma and Deralwa in Hanlé and are not operational during periods when local communities cannot afford to

⁵⁷ Mobilization des eaux à usage domestique et agricole

⁵⁸ There are 23 boreholes in the region of Dikhil, including 15 equipped with solar panels.

⁵⁹ There are 15 boreholes in Tadjourah, including six equipped with solar panels.

purchase fuel. In certain instances, borehole pumps are too small to deliver adequate volumes of water to meet the needs of local communities. For example, in Kouidi Koma the existing solar-powered borehole pump is inadequate for irrigating the 8 ha of agricultural land for which it was established. Therefore, most of the existing infrastructure for water delivery in the intervention sites requires improvement. This challenge is exacerbated by the limited capacity of local communities to operate and maintain borehole equipment. The lack of detailed information on groundwater location, quantity and quality is an additional challenge to the development of water resources, particularly in Hanlé. In the case of Tadjourah and Marsaki Wadi, there is some existing information on water resources as the DRH has recently conducted extensive groundwater studies in these locations.

95. *Agropastoralism*: Pastoralism is a traditional livelihood in Djibouti. However, the increased frequency and severity of drought has led to the loss of a large proportion of Djibouti's national livestock herd, particularly in Hanlé. As a result, crop cultivation is increasingly being adopted by rural communities. The MAPE-RH is involved in multiple initiatives to promote food security with the support of various partners (see Section 5). For example, in Hanlé, the FAO has funded the development of several agropastoral plots. Similar agropastoral plots have been established in Tadjourah, such as in Kalaf. In both Hanlé and Tadjourah, the main factor constraining the success and expansion of agropastoralism is the limited technical capacity and knowledge of the local communities. Various national initiatives are promoting the use of drought- and salt-resilient plant species in agricultural areas. For example, CERD is currently implementing a project to increase the propagation of date palm trees through asexual propagation using tissue culture techniques (see the "Baseline projects").

96. *Early Warning Systems*: The NDRAMS project, implemented by CERD and funded by Global Facility For Disaster Reduction and Recovery (GFDRR), aims to reduce the vulnerability of Djibouti's communities to floods. This project was initiated in 2011 and was initially focused on Djibouti Ville. At present there are no EWSs in the LDCF project intervention sites, however, the second phase of the NDRAMS project will begin in January 2014 and will include activities in Tadjourah. The development of this EWS project will be guided by information sources such as the FEWS NET database, Meteosat, the WHYCOS and the Hydromet. The location of pilot EWS activities was prioritised according to vulnerability to floods and the size of the threatened population. For this reason no EWS has been planned for Hanlé as yet.

97. *Livelihoods*: Poverty in Djibouti is closely linked to the few options in terms of livelihoods. This constraint is partially a result of a general lack of technical knowledge and capital. However, several initiatives such as the aforementioned FAO project have recently introduced new livelihoods such as aviculture. The success of these activities cannot yet be measured because they have only recently been adopted.

98. *Institutional and technical capacity*: There is limited synergy and coordination between the various ongoing environmental projects in Djibouti, which is partly attributable to a lack of knowledge-sharing systems. This prevents the upscaling of successful local efforts to regional and national scales. A CDNCC⁶⁰ was created in 1999 according to a presidential decree⁶¹. However, regular meetings of this committee were not held. In 2004, another presidential order called for the creation of a CTDD⁶². The CTDD was led by the MHUE and comprised representatives of relevant ministries and other national organisations⁶³.

⁶⁰ Comité Directeur National des Changements Climatiques.

⁶¹ Order n°99-0277/PR/MATETA.

⁶² Comité Technique pour le Développement Durable.

⁶³ Decree n°2004-0092/PR/MHUE.

However, the CTDD did not meet regularly and did not make a significant improvement to the coordination of relevant initiatives.

99. *Microfinance opportunities:* The majority of Djibouti's population does not have access to loan finance and do not make use of financial services. As a result, these communities have limited opportunities to invest in improved livelihood opportunities. The development of microfinance options will support Djibouti to achieve the Millennium Development Goal related to "increasing the purchasing power of the most impoverished people". The Social Development Agency of Djibouti (ADDS⁶⁴) was created in 2008 to support livelihood improvement, job creation, and the creation and strengthening of finance structures. The operational arm of the ADDS, the Popular Bank for Credit and Saving (CPEC⁶⁵), was created in 2009. The National Strategy for Microfinance was created in 2012 to strengthen and diversify financial opportunities for the population and increase the access of impoverished households to loan finance. In Djibouti-Ville, micro-loans have mainly been used to create small businesses such as shops and restaurants⁶⁶. The CPEC is supported by funding from the AfDB and has a particular focus on providing financing to women.

100. The development of microfinance opportunities in agriculture is one of the objectives of the National Microfinance Policy (NMP) 2012-2016⁶⁷. Under the NMP 2012-2016, new microfinance investment offices will be established, additional fund for micro-loans will be raised and diverse loan products will be promoted to stakeholders in the agricultural sector. The ADDS has implemented several small-scale projects to promote access to microcredit in the agricultural sector. There are also several emerging initiatives which are developing microfinance options for the pastoralism sector. Such initiatives include the ADDS, which is currently developing a microfinance scheme for pastoralism, and the Adaptation Fund project which includes activities related to the development of microfinance opportunities for pastoralists and agropastoralists in the plains of Grand and Petit Bara.

101. A tabular analysis of the baseline for each project component is presented in Table 5 in section 3.7.

Baseline Projects

102. The LDCF project will build on the ongoing activities of selected baseline projects described below. The fourth component of the LDCF project will improve the synergy between the baseline projects.

103. *INDS/PIP:* The first INDS was implemented during the period 2007-2012. A second INDS (2011-2015) was established in 2011 which included the same action plans as its predecessor. A Public Investment Programme (PIP) was developed to contribute to the goal of achieving MDGs and which supports priorities contained in the INDS. The intervention priorities defined by the INDS include:

- the increase of water availability through the creation of hard infrastructure, such as wells, boreholes, water points and reservoirs, and the increase of knowledge about current and future water availability;
- the building of tourism infrastructure, the increase of funding for tourism projects, and the training of communities in the development of tourism activities;
- the increased use of sustainable agricultural practices, particularly water and soil use and pest control (focused on two sites in particular, one of which is Hanlé); and

⁶⁴ Agence Djiboutienne de Développement Social.

⁶⁵ Caisse populaire d'Épargne et de Crédit de Djibouti-Ville

⁶⁶ <http://www.adds.dj/developper-la-microfinance-islamique-pour-lutter-contre-la-pauvrete-1875.html>

⁶⁷ Project Document of the Adaptation Fund project.

- the improvement of water points, the increase of commercial opportunities for pastoralists, research on the effects of climate change on the agriculture sector in collaboration with CERD and MHUE, the training of local communities in beneficial and suitable agriculture practices, the increase of institutional and financial capacity and the development of vegetable gardens around schools⁶⁸.

Several projects have been implemented to address these intervention priorities. These projects include the PROMES and PRODERMO projects which the LDCF project will build its activities upon.

104. *PROMES-GDT* (US\$ 3 million over six years): The PROMES-GDT was created by the government to promote rural development as part of the INDS. PROMES-GDT was launched in 2007 by the MAPE-RH with the support of FIDA⁶⁹, FFEM, PAM, FEM and UNDP⁷⁰. This programme will be implemented until 31 December 2014. The main objective of the PROMES-GDT is to improve the livelihoods of rural communities through the sustainable use of natural resources⁷¹. The programme is focused mainly on three areas, including the Day Forest, Randa-Makarassou and Dora regions in the north of Tadjourah. The PROMES-GDT activities which the LDCF project will build upon are described below.

- *Water availability*: Several water reservoirs, water retention basins for pastoral plots and micro-dams have been constructed or repaired. The LDCF project will expand these activities to other sites in Tadjourah and will benefit from lessons learned as well as guidelines developed and published in the PROMES-GDT mid-term report.
- *Agropastoralism*: One of the objectives of the PROMES-GDT is to improve fodder availability by establishing fenced grazing plots to exclude livestock and facilitate the recovery of fodder plants. However, the programme has had difficulty obtaining the support of the local communities for this approach. The LDCF project will provide training to local communities on the benefits of sustainable agropastoral practices. This training will promote the use of grazing enclosures. Additionally, the establishment of agropastoral plots which incorporate climate-resilient plants will increase the sustainability of the PROMES-GDT interventions.
- The LDCF project will build on PROMES-GDT by: i) restoring degraded watersheds, pastoral rangelands, riparian areas and mangroves using a combination of EbA and hard engineering techniques, that will increase the resilience of water management infrastructure to climate and climate change-related hazards such as droughts, floods and erratic rainfall; ii) providing scientifically rigorous information to guide the location and appropriate design of sustainable, climate-resilient water management infrastructure; iii) increasing knowledge and technical capacity at national and local levels to plan and implement sustainable, climate-resilient water management practices and cost-effective adaptation measures under conditions of climate change (see Appendix 26).

105. *PRODERMO* (US\$ 5.8 million over five years): The PRODERMO project is led by MAPE-RH with the funding support of the WB and IDA. This project was initiated in 2012 and is currently being implemented in some parts of Hanlé and Tadjourah (Appendix 11 Figure 8). PRODERMO was designed to maximise the synergies of PROMES-GDT activities and to target areas that are not covered by PROMES-GDT, namely, Hanlé, Tadjourah, and Khor Angar and Oulma in Obock. The objectives of PRODERMO include: i) increase rural communities' access to water; ii) enhance their capacity to manage water; and iii) enhance their capacity to manage agropastoral resources. These objectives will be achieved using a

⁶⁸ in collaboration with the MHUE and MAPE-RH.

⁶⁹ Fond International pour le Développement de l'Agriculture.

⁷⁰ PROMES-GDT MTR June 2012.

⁷¹ <http://www.dj.undp.org/pratiques/FichePROMES-GDT.html>

participatory approach to community-based development⁷². Similar activities to the PROMES-GDT project are being conducted by PRODERMO in Hanlé and will be built on by the LDCF project, including: i) the construction of water reservoirs, water retention basins and wells, the rehabilitation of boreholes, and the equipping of all of these with solar-powered pumps; ii) the rehabilitation and demarcation of six pastoral plots of 400 ha each; and iii) the development of alternative livelihoods such as handicrafts. The construction of two boreholes in Darkenlé and Ad Bouya is scheduled for 2014. These boreholes will be used to irrigate two of the agropastoral plots established by the LDCF project in Tadjourah. Additionally, the LDCF project will build on the PRODERMO project by: i) providing scientifically rigorous information to guide the location and appropriate design for the sustainability and climate-resilience of water management infrastructure and restoration activities in pastoral rangelands; ii) building hard infrastructures such as gabion walls that will increase the resilience of water management infrastructure to climate and climate change-related hazards such as droughts, floods and erratic rainfall; and iii) increasing cost-effectiveness of PRODERMO investments through providing information on successes and failures of alternative livelihood options and best-practice implementation protocols (see Appendix 26).

106. The lessons learned by PRODERMO/PROMES-GDT technical teams on the design, construction and maintenance of water extraction and retention infrastructure will be used by the LDCF project. Additionally, the approach used by PRODERMO to engage communities in reforestation will also be adopted in the LDCF project. Knowledge on tree nursery management and forest preservation will be shared between projects.

107. PWSSRA (US\$ 10.1 million for the period 2013–2017): The Project on Water Supply and Sanitation in: i) the Rural Areas of Tadjourah, Arta and Ali Sabieh districts; ii) the district centres of Tadjourah and Ali Sabieh (PWSSRA) is funded by the AfDB and coordinated by the MAPE-RH. The programme's objective is to sustainably improve the living conditions of the rural populations in Djibouti. The implementation sites for this programme are the Tadjourah, Arta and Ali Sabieh regions. The project activities include: i) constructing water management infrastructure; ii) conducting public awareness campaigns to promote hygiene; iii) creating Water Management Committees; and iv) training local communities in the maintenance of water management material. The LDCF project will enhance the resilience of the PWSSRA's activities by: i) providing scientifically rigorous information to guide the location and appropriate design for the sustainability and climate-resilience of water management infrastructure and restoration activities in pastoral rangelands; ii) increasing national and local technical capacity for sustainable management of water resources and infrastructure, including through the establishment of efficient local water management committees, water reuse and water harvesting techniques, and appropriate training tools; and iii) increasing the climate resilience of the communities' livelihoods and the infrastructure constructed by the PWSSRA project (see Appendix 26).

108. PDPD⁷³ (US\$ 500,000): The Project of Support to the Development of Date Palm Cultivation (PDPD) is funded by the Islamic Development Bank and was initiated in 2005. This objective of this project is to promote the planting of date palm trees for food production and protection against drought in arid countries. The PDPD project is part of the national strategy for the improvement of food security and the decrease of rural poverty. The PDPD is coordinated by the MAPE-RH. At present, 20,000 palms have been planted. Additionally, a laboratory for the in vitro propagation of date palms was established at CERD in 2006 to meet the increasing demand for planting material. Trees propagated in this laboratory were selected for their tolerance to adverse growing conditions such as droughts and saline soils.

⁷² PRODERMO project document, 23 February 2011.

⁷³ Projet de Développement des Palmiers Dattiers.

The process of hardening off⁷⁴ has been recognized as a critical phase in the cultivation of date palms and as a result the PDPD has been investigating acclimation protocols since 2011 to select the most appropriate method. The PDPD has established collaborations with Spanish and French researchers to improve the protocols for in vitro cultivation of date palm trees. This project will provide valuable scientific information, cultivation protocols and planting material for the activities of Component 3 of the LDCF project. These activities are related to the creation and rehabilitation of agropastoral plots. The LDCF project will enhance the resilience of the PDPD project to climate change by: i) increasing the productivity and rate of establishment of date palm trees as a result of improved access to irrigation; and ii) increasing national knowledge and technical capacity for the sustainable cultivation of date palm trees in rural areas.

109. The UNEP-IUCN-WAMIP project on **Enhancing the awareness and knowledge of pastoralism** seeks to: i) increase knowledge on pastoralism as a terrestrial ecosystems land management option; ii) contribute to long-term and adaptive management of landscapes in Africa, Asia, Europe, and South America that are vulnerable to climate change; and iii) raise the political attention around pastoralism as a valued land management option. It also aims to prepare policy frameworks for technical and advisory support to countries on including pastoralism in design, planning and implementation of land-use management based on an ecosystem approach and national Green Economy agendas. The project has a strong focus on sustainable and climate-resilient livelihoods. The LDCF project will build on the UNEP-IUCN-WAMIP by: i) providing scientifically rigorous information to guide the development of pastoral activities in Hanlé and Tadjourah, including consideration of climate change effects; ii) increasing the resilience of pastoral rangelands to climate change effects by reducing unsustainable management practices and providing alternative livelihood options; and iii) increasing local and national capacity to implement sustainable and climate-resilient agropastoral practices.

110. The UNEP preparatory project for **Using Ecosystem-based Adaptation (EbA) for Food Security in agriculture-dominated landscapes in Africa (EbAFoS)** focuses on building ecological resilience of food systems and enhancing food security through Ecosystem-based Adaptation (EbA) approaches in countries in Sub-Saharan Africa. The project will contribute parallel co-financing of US\$ 600,000 to the proposed LDCF project. Among expected outcomes, the activities will start bridging the gap between science and policy that currently exists by gathering evidence from the demonstration of EbA approaches for food security. This evidence can be applied to the proposed LDCF project. The LDCF project will build on the UNEP EbAFoS project by: i) reducing food insecurity in Hanlé and Tadjourah through the establishment and demarcation of sustainable, productive agropastoral plots, including the provision of appropriate agricultural inputs and infrastructure to supply and store water; ii) increasing resilience of ecosystems to climate change effects through reducing unsustainable management practices and providing alternative livelihood options; and iii) increased knowledge and technical capacity at national and local levels to plan and implement locally appropriate and cost-effective adaptation measures, including both EbA and hard engineering approaches.

The UNEP-European Commission ENTRP project on **Building Capacity for Coastal Ecosystem-based Adaptation in Small Island Developing States (SIDS)** will assist countries and regions to develop and apply EbA approaches to maintain and enhance the resilience of tropical coastal ecosystems and the services they provide to coastal communities in SIDS. Although the project's geographical focus is on SIDS in Africa and the Caribbean, the project will contribute parallel co-financing through some of the planning and ecosystem management tools and technical guidance to assist decision making. It will also

⁷⁴ The process of acclimating laboratory-grown seedlings for transplanting into the field.

contribute through regional capacity building and global transfer of good practices and experiences gained, particularly with regards to mangrove management. The LDCF project will build on the UNEP-European Commission ENTRP project by: i) increasing resilience of EbA activities to climate change-related hazards as a result of the introduction of complementary hard engineered adaptation measures such as gabion walls; and ii) increasing knowledge and technical capacity at national and local levels to plan and implement locally appropriate and cost-effective adaptation measures, including both EbA and hard engineering approaches.

2.7. Linkages with other GEF and non-GEF interventions

111. In May 2013, the **Rural Livelihoods Adaptation to Climate Change in the Horn of Africa (RLACC)** programme was approved. It will be implemented in Djibouti and Kenya. The implementing agency (IA) is the AfDB and the executing agency (EA) in Djibouti is the MAPE-RH. The objectives of RLACC are to: i) increase the resilience of local pastoral and agropastoral communities to climate change; and ii) promote climate resilient livelihoods. The AfDB project includes the implementation of public awareness campaigns on climate change and training of local governments for the integration of climate change adaptation into development plans. As such, there is potential for synergy between RLACC and the LDCF project. In particular: i) cross-pollination of adaptation concepts, lessons learned and protocols; and ii) community engagement. However, the RLACC activities and implementation sites in-country have not yet been selected.

112. From 2012-2016, the **Developing Agro-Pastoral Shade Gardens as an Adaptation Strategy for Poor Rural Communities in Djibouti** project is being implemented, funded through the Adaptation Fund (AF). UNDP is the IA with the MHUE and CERD as EAs. The objective of the project is to “diversify and promote climate-resilient agropastoral practices in rural Djibouti”. This will be achieved by: i) increasing the capacity of agropastoral communities to secure sustainable access to water; ii) developing shade gardens to support agropastoral systems that are diversified, replicable and climate resilient; and iii) securing access to finance for local communities to develop agropastoral enterprises that are climate resilient. The project will be implemented in plains of Grand and Petit Bara in the Arta and Dikhil Regions. Many activities of the AF project are similar to the LDCF project activities such as the construction of water management infrastructures, the creation of agropastoral shade garden plots, the creation of agropastoral cooperatives and the development of microfinance opportunities for agropastoralists. The LDCF project will benefit from the experience gained by the AF project during implementation. For example, the LDCF project budget included consideration of lessons learned by the Adaptation Fund project regarding under-estimation of project costs. Collaboration has already been initiated between the two projects and will be continued during the implementation of the LDCF project to ensure that both project’s activities are complementary and additional. The exchange of lessons learned, tools and protocols between the two projects will guide the implementation of project activities.

113. The first LDCF project, **Implementing NAPA Priority Interventions to Build Resilience in the Most Vulnerable Coastal Zones in Djibouti**, was initiated in September 2010 and will end in late 2014. It is being implemented in two villages, Khor-Angar and Damerjog, located in the regions of Obock and Arta, respectively. This project has three components: i) strengthening of institutional capacity for integrated coastal zone management and integrated water resources management; ii) rehabilitation of ecosystems that regulate the coastal zone; and iii) development of climate forecasting and early warning systems. The following activities of the first LDCF project are linked to this second proposed LDCF project: i) improving access to water; ii) restoring mangroves; and iii) development of sustainable fisheries and ecotourism around the restored mangroves. The proposed LDCF project will build on the lessons learned from the first LDCF project. For example, the

protocols developed for mangrove restoration during the first LDCF project will be used in the proposed project. And information on water re-use for agriculture generated in the first LDCF project will inform the implementation of the agropastoral activities of the proposed project. The proposed project will, in addition, benefit from the building of government capacity during the first LDCF project. This capacity building included the training of government stakeholders on climate change effects and adaptation. The link between the first and second LDCF projects will be further strengthened by including participants/stakeholders from the first LDCF project into the Project Steering Committee (PSC) of the proposed project. Additional opportunities to include participants/stakeholders from the first LDCF project into the activities of the second LDCF project will be identified.

114. The UNDP-led LDCF project, “**Supporting Rural Community Adaptation to Climate Change in Mountain Regions of Djibouti**” is anticipated to be submitted for funding approval in January 2014. The objective of the UNDP project is to reduce the climate-related vulnerabilities facing the inhabitants of mountainous regions of Djibouti through institutional strengthening, climate-smart water management and targeted investment. The components and proposed activities of the UNDP project are closely aligned with this UNEP-led LDCF project and it is anticipated that both projects will benefit from continuous cooperation and coordination. The goal of Component 1 of the UNDP project is to support the re-establishment of the National Climate Change Committee (NCCC), which is also an objective of this UNEP LDCF project. LDCF resources will be used in the UNEP project to host an initial workshop in order to bring stakeholders together to participate in a fact-finding and gap analysis exercise for the NCCC. The UNDP LDCF project will build on these initial activities by implementing several long-term measures to build the capacity of the NCCC and support the design and implementation of a National Climate Strategy for Djibouti. The UNDP project will also be implementing activities to increase awareness of climate change and providing training on climate change adaptation to local and national government which will build on the capacity, skills and protocols developed by this UNEP LDCF project. Both projects will include activities in Tadjourah district – the UNEP project activities will be implemented in downstream areas of Tadjourah whereas the UNDP project will focus on upstream watershed areas in Tadjourah – and as a result there is an opportunity for the activities of the two projects to be coordinated to ensure that they are complementary. It will be important for stakeholders of both projects to maintain close collaborative relationships to ensure that both initiatives benefit from shared knowledge and information as well as to reduce the risk of duplication of efforts. Other activities which the UNDP initiative is likely to introduce which will be supported by the pilot activities of the UNEP LDCF project include: i) hard engineering interventions such as construction and repair of gabions; ii) establishment of nurseries for revegetation of degraded areas; iii) providing training on sustainable agropastoral practices; and iv) promotion of alternative livelihood options including handcrafts. The UNEP LDCF project will provide several resources of information that can be used to guide the design and implementation of the UNDP project, such as the hydrological and pedological studies in Tadjourah and the research on the adaptation benefits and cost-effectiveness of the UNEP LDCF project’s approach.

115. The **Great Green Wall (GGW)** is a planned project to plant a wide belt of trees across Africa’s Sahara and Sahel regions. Within Djibouti, the MHUE has developed a national strategic plan for the establishment of the GGW. This was done in collaboration with UNEP and the African Forest Forum (AFF). The objective of the GGW is to address the social, economic and environmental effects of land degradation and desertification in the Sahara and Sahel. In Djibouti, the GGW is intended to improve the socio-economic conditions of 120,000 people living adjacent to it. Both the GGW and the proposed LDCF projects will mutually benefit from the lessons learned in each project. For example, the proposed LDCF project will build on information available in the GGW project concerning the establishment of nurseries. Similarly, the LDCF project will provide the GGW with relevant

information on climate-resilient species to be planted. In addition, the increased public awareness on desertification and ecosystem restoration will promote the support for the GGW from local communities.

116. The FAO is implementing the **Technical Cooperation Programme (TCP)** in Djibouti. Within this programme, vegetable and fodder crop seeds are provided to 7,000 vulnerable farming families. The programme also provides hoes, rakes, watering cans, pesticides and salt licks for livestock. FAO's interventions in Djibouti also include: i) implementation of the Special Programme for Food Security (PSSA); ii) preparation of the National Food Security Programme (PNSA); iii) promotion of diversified livelihoods; iv) control of illegal fishing; v) reducing the vulnerability of local communities to inflation of food prices; vi) providing technical assistance in the preparation of laws on plant control; vii) facilitating the awarding of agricultural land concessions to private investors; and viii) securing funds to assist local communities affected by droughts. Interactions with the TCP will benefit the proposed LDCF project, particularly in diversifying alternative livelihoods and reducing food security.

117. Since 2006, the **International Fund for Agricultural Development (IFA/FIDA)** has provided financial support for the development of the microfinance and microenterprise sectors. FIDA's interventions complement the new legislation on microfinance as well as the strategy for its enforcement. This strategy was prepared in collaboration with UNDP. In particular, FIDA is developing a network of microfinance institutions to support farmers. FIDA, together with the Programme de Petites Subventions – Fonds pour l'Environnement Mondial (PMF UNDP-GEF), also funds the Surface Water Recharge for Agropastoral Development (MESDAP) programme. The MESDAP will: i) improve surface water recharge by the construction and restoration of dams; and ii) develop new – and strengthen existing committees – for the management of watersheds and dams. Interaction has been initiated between MESDAP and the LDCF project to prevent overlap of activities.

118. The Observatory of Sahara and Sahel (OSS) is executing the **Inter-governmental Authority on Development**⁷⁵ (IGAD) project funded by the AfDB and implemented in 8 countries including Djibouti. IGAD started in 2007 and focuses on mapping, monitoring and evaluating water availability in the IGAD region. The LDCF project will benefit from the experience of the IGAD project in: i) monitoring and evaluation of adaptation capacity; ii) monitoring and evaluation of water resources; and iii) the increase of government capacity regarding water management. The proposed LDCF project will contribute to filling the gap in the data available on water resource in the IGAD region, which is the objective of the second phase of the IGAD project initiated in 2013.

119. In Djibouti, there are several projects and programmes that are focussed on the provision of water. The LDCF project will be linked to those listed below.

- The European Union (EU) is funding the restoration of: i) solar-powered borehole pumps in rural areas; and ii) potable and wastewater systems. Coordination between the EU and the proposed LDCF project will promote efficacy of these interventions.
- The UN Office for the Coordination of Humanitarian Affairs (OCHA) project builds upon the ongoing FAO programmes that restore solar-powered pumps to extract groundwater for irrigation. Moreover, the UN Country Team provides assistance to vulnerable communities living in drought-affected areas.
- Within the Food-for-Work programme, families assist with the construction of underground cisterns and other water storage systems.

⁷⁵ IGAD is an eight-country trading bloc based in Eastern Africa. Including governments from the Horn of Africa, Nile Valley and African Great Lakes, its headquarters are located in Djibouti.

- The Islamic Development Bank⁷⁶ is providing financial support for a feasibility study for the construction of two dams in Ali Sabieh and Tadjourah.
- The World Bank is funding several projects that address the vulnerability of local communities to droughts. These projects focus on recharging surface and ground water.
- The Saudi Fund for Development increases access of rural communities to potable water.
- The interventions of the United Nations Children's Fund (UNICEF) include building the resilience of local communities to droughts by restoring and constructing dams and drilling boreholes.
- The Abu Dhabi Fund for Development constructs dams and boreholes to increase the availability of potable water in Djibouti. Additionally, it provides equipment for the use of solar energy.
- The African Development Bank (AfDB)⁷⁷ funds the Support to the Surface Water Recharge programme, which provides water for domestic and agricultural uses.
- The French Red Cross and Djibouti's Red Crescent construct dams and boreholes to increase surface water availability.

120. The LDCF project will also establish linkages with the projects and programmes that are focused on agriculture and food security. These include:

- the UN's Central Emergency Response Fund, which is providing funds to assist 85,000 rural and peri-urban pastoralists through the distribution of seeds and equipment;
- the Islamic Development Bank (IDB), which provides financial support to the Special Food Security Programme (PSSA)⁷⁸ initiated by FAO; and
- the Arab Authority for Agricultural Investment and Development, which is funding a pilot project that focus on the production of vegetables in greenhouses.

⁷⁶ Banque Islamique de Développement.

⁷⁷ Banque Africaine de Développement.

⁷⁸ Programme Spécial de Sécurité Alimentaire.

SECTION 3: INTERVENTION STRATEGY (ALTERNATIVE)

3.1. Project rationale and policy conformity

Project rationale

121. Communities living in Hanlé and Tadjourah have been identified as highly vulnerable to climate change effects. The proposed LDCF project will increase the resilience of these communities to both observed and anticipated effects of climate change. The main effects – identified⁷⁹ to date and expected to increase in severity – in these two areas are: i) frequent prolonged droughts; and ii) extremely erratic precipitation. To reduce the impacts of these climate hazards on local communities, the proposed LDCF project will implement the following adaptation interventions: i) construct hard infrastructure as a buffer to flooding; ii) improve water extraction and retention systems; iii) restore degraded ecosystems to generate beneficial ecosystem goods and services; and iv) promote climate-resilient alternative livelihoods based on sustainable management of natural resources.

122. In Djibouti's NAPA, a number of barriers to reducing the effects of climate change have been identified. These barriers include: i) inefficient prevention mechanisms of natural disasters; ii) ecosystem degradation; and iii) limited institutional and technical capacity to plan appropriate adaptation interventions. The proposed LDCF project's components are designed to address these individual root causes.

123. Furthermore, there are a number of barriers to the proposed interventions (see Section 2.3). To overcome these barriers, the proposed LDCF project will increase institutional and technical capacity at national and local scales. This will be done through training and workshops (see Section 3.3).

124. The project will introduce several adaptation measures using the Ecosystem-based Adaptation (EbA) approach. UNEP defines EbA as “the use of biodiversity and ecosystem services as part of an overall adaptation strategy to help people and communities adapt to the negative effects of climate change at local, national, regional and global levels”⁸⁰. The restoration of mangroves, Acacia woodland and oasis ecosystems using an EbA approach will generate multiple social and economic benefits for local communities. The restored mangrove ecosystems will increase fish species diversity, reduce salt water intrusion and protect coastal areas against erosion. The restored Acacia woodlands will reduce desertification, wadi bed sedimentation as well as the effects of flooding. The restored oasis ecosystems will increase the productivity of local agriculture, increase household income by generating marketable NTFPs and generate numerous other benefits such as production of fodder for livestock. These EbA interventions will increase local knowledge and capacity for developing, implementing and designing EbA projects in diverse ecosystems to increase local resilience to the negative impacts of climate change.

125. The demonstration of EbA options for climate change adaptation will be balanced with demonstration of hard infrastructural options including, *inter alia* i) construction and repairs of flood protection infrastructure such as gabions in flood-prone wadis; ii) installation or repairs of water management infrastructure such as boreholes, reservoirs and grey water re-use systems; and iii) introduction of fences or appropriate barriers to prevent grazing by livestock..

⁷⁹ Djibouti's NAPA.

⁸⁰ Travers et al. 2012. Ecosystem-Based Adaptation Guidance: Moving from Principles to Practice. UNEP Working Document.

126. The project will generate sustainable benefits after the implementation period by disseminating lessons learned to communities beyond the intervention sites. Furthermore, the project will support post-graduate studies by MSc and PhD students which will facilitate evidence-based adaptation planning and adaptive management. The lessons learned during the project will be routinely collated and synthesised. The resulting database and information will increase the national capacity to plan, implement and upscale climate change adaptation options – including both hard infrastructural options and EbA across Djibouti.

Policy conformity

127. In addition to addressing the priorities of the NAPA, the proposed LDCF project is aligned with other priorities identified in the National Initiative for Social Development (INSD). These include: i) increasing water availability; and ii) developing agropastoral systems. In addition, the project will build on and support the activities of two projects (PROMES and PRODERMO) designed within the frame of the project titled “*Country based programme to end drought related emergencies in the Horn of Africa*”⁸¹.

128. The activities of the proposed LDCF project in coastal areas are also aligned with the Regional Organization for the Conservation of the Environment of the Red Sea and Gulf of Aden (PERSGA). Similarly, the project is aligned with the National Law on Environment⁸² (NLE) adopted in 2000 (Law n°106/AN/00/4ème L). The NLE protects and promotes the restoration of environmental resources as well as the reduction of future ecosystem degradation.

129. The United Nations Development Assistance Framework (UNDAF) has identified a number of barriers to Djibouti’s overall development. These include food security and access to potable water. The proposed LDCF project will contribute to overcoming these barriers through ecosystem restoration.

130. Lastly, the project activities are aligned with the National Programme against Desertification⁸³ (PNLD) implemented by the MAPE-RH. PNLD promotes: i) sustainable use of natural resources; and ii) socio-economic activities in rural areas.

LDCF conformity

131. Djibouti is party to the UNFCCC and the Kyoto Protocol. As described below, the LDCF project is in line with the guidance and eligibility criteria defined in those documents.

132. Participatory approach: activities to be undertaken by the project were selected through numerous stakeholder consultations such as the inception meeting, the validation meeting, field visits and email exchanges (see Appendix 11, 12 and 13). The design of the project interventions also builds on the lessons learned in the first LDCF project (See Section 2.7).

133. Implementing NAPA priorities: the project addresses the 1st, 3rd, 4th, 5th and 7th national priorities out of the 8 identified in the plan⁸⁴.

134. Learning-by-doing approach: the project will promote the sharing of lessons learned through a knowledge platform developed under Component 4. This will further improve synergy between different stakeholders (see Section 3.3) and the coordination with aligned projects (see Section 2.6 for baseline projects). Additionally, the successful adaptation

⁸¹ Programme de pays pour mettre fin aux urgences liées aux sécheresses dans la corne de l’Afrique.

⁸² Loi-cadre sur l’Environnement.

⁸³ Programme National de Lutte contre la Diversification.

⁸⁴ See introduction of section 2.1.

measures piloted by the project will be used to inform national and sub-national development plans and policies as well as aligned projects.

135. Multi-disciplinary approach: the interventions of the proposed LDCF project require expertise from various disciplines. These include ecology, meteorology, engineering, agroforestry, socio-economy and climate change. In addition, interventions will include hard infrastructure, ecosystem restoration, capacity strengthening and public awareness.

136. Gender equality: gender equality will be a strong focus during the project implementation. Women will be involved in project planning and decision-making. Project interventions at a local level will explicitly solicit women's perspectives and ensure their representation in decisions affecting their livelihood. In particular, the project will: i) increase women's access to water and; ii) provide women with training in EbA and sustainable agricultural practices.

137. Complementary approach: from inception, the proposed LDCF project will collaborate with the management teams of all the baseline projects⁸⁵. Additionally, the project will develop a platform for sharing lessons, knowledge and information. This will prevent the redundant duplication of activities. This platform will include other ongoing projects that are aligned with the LDCF project. These include the Great Green Wall and the Djibouti Adaptation Fund project (See Section XX).

Overall GEF conformity

138. The proposed LDCF project meets overall GEF requirements in terms of implementation and design.

- Sustainability: staff training and capacity strengthening within national and local institutions are priorities of the project. Local communities will also be trained and have capacity developed. Strengthened capacity at all levels will promote sustainability.
- Replicability: the proposed LDCF project will systematically document the activities, decisions, strategies, results, lessons learned and guidelines for the design and implementation of future projects. This documentation will enable the development of a robust planning framework in conjunction with stakeholder participation.
- Monitoring and Evaluation (M&E): the project design includes an M&E framework. This framework will be used to measure the indicators of the proposed design. Lessons learned will be documented and disseminated.
- Stakeholder Involvement: the project design was developed through extensive stakeholder consultation. The stakeholders' involvement in the project will be clearly defined and signed off by each stakeholder group during the initial phases of project implementation.

3.2. Project goal and objective

139. The overarching goal of this second LDCF project in Djibouti is to increase the resilience of the Djiboutian society and economy to the effects of climate change and enhance the capacity of the government to integrate adaptation into its development planning. The objective of the project is to implement climate change adaptation

⁸⁵ Meetings with PROMES and PRODERMO management teams were held during the validation mission.

interventions that protect human populations, maintain productive assets and enhance ecosystem resilience in the regions of Hanlé and Tadjourah⁸⁶. The project activities will focus on the most vulnerable communities in these two regions.

3.3. Project components and expected results

140. See Appendix 24 for a summary of activities under each of the LDCF project components as well as linkages between the LDCF project components, outcomes and outputs in relation to the project goal and objective.

Component 1: Protection against water-related climate change hazards

Alternative scenario

141. The LDCF resources will be used to implement EbA (Component 2) and construct hard infrastructures (Component 1) to increase the resilience of local communities to climate-related hazards – particularly droughts and floods. The first component of the project will focus on increasing the resilience of communities in Hanlé and Tadjourah. Levees and gabion walls will be built to provide a physical barrier that will slow water flow and reduce the impact of floods in the project areas⁸⁷. Six gabion walls will be built in wadis around Tadjourah Ville (four wadis) and Hanlé (two wadis). The location of these gabion walls will be selected based on an assessment of vulnerability of nearby urban areas to floods. The vulnerability to floods of communities in Tadjourah Ville will be further reduced through the rehabilitation of an existing sand levee in the Marsaki wadi. The project will also reduce the vulnerability to floods of agropastoral households in Hanlé by building gabion walls in three additional wadis.

142. As discussed in Section 2, the availability of fresh water in Djibouti is currently insufficient to meet local demands⁸⁸, including within the project areas of Hanlé and Tadjourah. This is partly a result of the limited availability of data on ground and surface water to support the development of Djibouti's water resources. The LDCF project will consequently undertake hydrological studies to generate detailed information on the availability and quality of ground and surface water in Hanlé and Tadjourah. These studies will be used to guide the construction of four boreholes, six reservoirs and approximately 20 gabion walls in order to increase the availability of fresh water. As a result, the project will increase the resilience of local communities to drought.

Outcome 1. The negative impacts of droughts and floods are reduced or averted.

Output 1.1. Protective measures against droughts and floods in cities and settlements.

This output is focused on building hard infrastructure to reduce the negative effects of floods and droughts on local communities in Hanlé and Tadjourah. The activities of this output will include: i) the construction of levees and gabion walls to decrease vulnerability to floods; and ii) the construction of boreholes and water-reservoirs to increase the availability of water for drinking and irrigation. In addition, LDCF resources will be used to rehabilitate, with gabions, the sand levee in the Marsaki Wadi. An Environmental Impact Assessment (EIA) should be conducted prior to all physical interventions as required by the National Law on Environment⁸⁹. Hence, the LDCF resources will be used to contract a national company which is experienced in conducting EIAs. The contracted company will investigate the

⁸⁶ LDCF project objective as described in the PIF.

⁸⁷ Details of these technologies are provided in Appendix 15.

⁸⁸ Daily water requirements are estimated to be 28 litres per person per day.

⁸⁹ Loi Cadre sur l'Environnement, 2000, n°106/AN/00/4ème L.

potential environmental effects of each of the project activities, such as the potential effects of the infrastructure and EbA interventions on water flow and sedimentation downstream.

143. Output 1.1 will generate multiple socio-economic benefits including *inter alia*: i) increased availability and quality of water for domestic use and irrigated agriculture; ii) reduced damage and economic losses resulting from floods; and iii) increased resilience of agriculture to droughts. The activities under Component 2 and 3 will complement this output by increasing ground water recharge through ecosystem restoration and the use of rainwater harvesting technologies such as *Zai*, contoured earthen bunds and ridged contours.

144. Solar power is not always efficient because of annual variability in solar radiation. Hence, the solar power boreholes presently used at the proposed LDCF project's intervention sites sometimes fail to pump enough water to meet water needs. Additionally, solar panels only work during daylight and batteries are very costly. Hence, the LDCF resources will be used to fund a technical feasibility study on the combined use of solar and wind energy. If the underground water resource is sufficient, this system would enable the pumping to occur 24 hours per day.

The activities to be implemented under Output 1.1 are:

1.1.1. Undertake Environment Impact Assessments (EIA) in Hanlé and Tadjourah – as described by the National Law on Environment – for installation of hard infrastructure.

1.1.2. Construct and rehabilitate gabion walls to protect urban areas in Tadjourah from flooding. This activity will include construction of: i) five gabion walls (total length 1.3 km) in the tributaries of Marsaki wadi; ii) five gabion walls (total length 1.1 km) in the tributaries of Bodoli wadi; iii) five gabion walls (total length 1.2 km) in the tributaries of Iboli wadi; and iv) three gabion walls (total length of 1 km) in Adbouyi wadi. In addition, this activity will include rehabilitation of one levee (2 km long, 2 m high and 2 m wide) at the lower reaches of the Marsaki wadi.

1.1.3. Construct 2 km of gabion walls in the wadis of Deralwa and Koudi Koma to reduce downstream flooding of urban areas in Hanlé.

1.1.4. Construct 0.7 km of gabion walls to reduce flooding of agropastoral plots in Issih Wehé, Rewao and Dawano, Hanlé.

1.1.5. Construct four boreholes in Tadjourah Region. This will include construction of two boreholes in Marsaki and one in Walwali to provide water to Tadjourah city, as well as one solar-powered borehole in Kalaf to provide water for agropastoral plots.

1.1.6. Install a water distribution network for the Darkenlé and Ad bouya boreholes developed by the PRODERMO project.

1.1.7. Rehabilitate two boreholes in Hanlé so that they pump up to 20 m³ of water per hour. This activity will include the following measures: i) install covers to reduce evaporation and algal growth in two existing borehole reservoirs in Koudi Koma and Liliya bouri; ii) repair the solar-power pump system in Koudi Koma's borehole; iii) install a solar-power pump system in Liliya bouri's borehole; and iv) install a water distribution system from each of those two boreholes to the corresponding agropastoral plot.

1.1.8. Construct six water-reservoirs with a storage capacity of at least 280 m³ each. This will include three water-reservoirs for the irrigation of agropastoral plots in Tadjourah Ville and three water-reservoirs for storing harvested rainwater in the rural areas of Tadjourah.

1.1.9. Undertake a pilot study for the use of hybrid solar- and wind-powered borehole pumps.

Output 1.2. A hydrogeological model of current and projected water resources availability.

145. At present, there is insufficient hydrogeological data to guide the development of sustainable water resource management practices in the intervention sites. Additionally, as discussed in Section 2.6, water scarcity is a major problem in Djibouti and several previous investments in improved water management have failed to increase water availability in the long-term. To address this challenge, extensive studies of water resources will be conducted prior to the construction of hard infrastructure for water management (Output 1.1). These studies will include assessments of water availability, water quality and sustainable water use rates under current conditions as well as under future predicted climate change scenarios. Firstly, data derived from monitoring as well as modelling of weather and climate will be collected to develop accurate predictions of climate change in the two intervention sites. Secondly, LDCF resources will be used to conduct detailed hydrological studies in the intervention sites. These studies will be used to guide the appropriate sites and approaches for construction of hard water management infrastructure identified during the PPG phase and will include: i) a review of the hydro-climatologic and hydro-geological data available; ii) a geological study using satellite data, aerial imagery and geological maps; iii) a geophysical study using electromagnetic and resistivity data; and iv) a geo-chemical study to understand the local dynamics of water resources, such as the patterns of recharge and circulation between surface and groundwater. The studies will provide information on the current distribution of water resources in the intervention sites as well as expected changes in groundwater recharge and distribution. Water quality parameters will be an important component of these water resources assessments of water resources because the quality of groundwater quality is frequently poor within the project areas. For example, groundwater is abundant in Hanlé but the measured concentration of fluoride is too high for human consumption at several sites (>3 mg per litre). Similarly, in Tadjourah, groundwater is often brackish and has a high concentration of salt as a result of sea water intrusion. Information generated by the hydrological studies will be used to guide the identification of appropriate activities and project sites in Output 1.1.

146. LDCF resources will also be used to conduct pedological studies to support the selection of appropriate sites for the construction and rehabilitation of the agropastoral plots in Hanlé and Tadjourah. A pedological profile will be established for each of the sites identified during the PPG phase as potential intervention sites for Component 3 of the proposed project. This profile will be established through physical and chemical analyses of soil samples, including analysis of physical texture and composition, water holding capacity and fertility. These studies will support the selection of appropriate species for cultivation in agropastoral plots as well as guiding the selection of appropriate intervention sites for the activities of Component 3.

147. LDCF resources will be used to procure hydrological monitoring equipment to increase the availability of information related to water resources. Equipment to be procured will include a limnigraph to measure the depth of surface water and a pluviograph to measure rainfall. Appropriate locations for the establishment of the hydrological monitoring equipment will be determined by the results of the hydrological studies.

148. Recycling and reuse of grey water is not commonly practiced in Djibouti. Therefore, a pilot study will be undertaken to investigate the potential to irrigate urban gardens in Tadjourah Ville using recycled grey water. Mosques' wastewater has been chosen for this

experiment because a large quantity of water is rejected every day from ablutions⁹⁰. This water is still relatively clear. Its reuse is unlikely to present any ethical problem. This water reuse system could be upscaled to other appropriate buildings - in Djibouti and neighbouring countries - if successful.

Activities to be implemented under Output 1.2 are:

1.2.1. Conduct climate change modeling studies in Hanlé and Tadjourah to update the data from 2006 on temperature, precipitations and sea level rise.

1.2.2. Undertake hydrogeological and pedological studies taking into account predicted climate change effects to identify suitable locations for the establishment of agropastoral plots and associated boreholes in Tadjourah.

1.2.3. Procure hydrological monitoring equipment in Hanlé and Tadjourah, including at least one pluviograph and one limnigraph at each location.

1.2.4. Undertake a pilot study for the use of recycled grey water from mosques for irrigation.

Component 2: Ecosystem rehabilitation, recovery and resilience

Alternative scenario

149. The second component of the LDCF project will complement the hard infrastructure built under Component 1. The objective of this component is to reduce the vulnerability of local communities to climate-related hazards through the strategic restoration of degraded ecosystems that will provide a buffer against the negative effects of climate change. Under this component, *Acacia* woodlands in Hanlé and Tadjourah as well as mangrove areas in Tadjourah will be restored by planting climate-resilient tree and mangrove species.

150. The two main causes of degradation of **Acacia woodlands** are drought and invasion by *Prosopis*. Hence, RWT will be implemented in the identified restoration sites prior to the planting activities **and** *Prosopis* will be removed when present in the identified restoration sites. The restoration of these degraded areas will increase ecosystem resilience to erosion and desertification. Additionally, the restoration of degraded sites will increase soil fertility and improve physical structure of soils.

151. The LDCF resources will also be used to **restore and protect** mangroves in the region of Kalaf. Mangroves were present in the region a few decades ago, **however at present there are virtually no remaining intact mangroves. The project will introduce several small mangrove nurseries and provide training and capacity-building to support local communities to undertake mangrove replanting. In addition to replanting mangrove areas, the project will also introduce protection measures to exclude livestock from the restoration areas.** If the replanting activities are successful (i.e. high survivorship of planted seedlings), mangrove replanting in Kalaf will be promoted during subsequent workshops, training and awareness-raising campaigns at local (Output 2.2) and national levels (Outputs 4.1 and 4.2).

Outcome 2. Fragile ecosystems are productive and resilient to climate change

Output 2.1. Restored vegetative cover and soil stabilized in Acacia woodlands in Hanlé and in Tadjourah

⁹⁰ An estimate of 5 litres of water per person per day is used for ablutions. An estimate of 250 litres per day per mosque could be reused.

152. This output focuses on the reforestation of degraded wadi banks and plains in Hanlé and Tadjourah using climate-resilient, non-invasive tree species that are adapted to the local environment. The selection of species to be planted for the restoration of *Acacia* woodlands restoration will be based on characteristics such as tolerance to water-logged conditions, drought and excessive salt concentration in soils. Indigenous tree species will be prioritised over exotic species in order to avoid unintended negative effects on biodiversity as a result of the project. However, exotic species which are assessed as unlikely to become invasive in the local environment should still be considered for inclusion in reforestation activities. Plants to be considered include *Acacia* species (e.g. *Acacia tortilis*, *A. asak*, *A. eheinbergiana*, *A. nilotica*), other tree species (e.g. *Salvadora persica*, *Cadaba rotundifolia*), and grasses such as *Sporobolus helvolus*. The restoration of the degraded *Acacia* woodlands will result in increased water infiltration into soil profiles, reduced flow of floods and reduced soil erosion. The physical restoration activities will be complemented by educating local communities on the potential to reduce their climate change vulnerability through EbA. A list of potential plant species to be included in reforestation activities and their attributes is presented in Appendix 9.

The activities to be implemented under Output 2.1 are:

2.1.1. Restore 100 ha of wadi banks with native *Acacia* trees and other climate-resilient plant species in order to control erosion and flood damage in Hanlé (~70 ha) and Tadjourah (~30 ha).

2.1.2. Establish two nurseries (one in Hanlé and one in Tadjourah) to produce tree seedlings for restoration activities. Nurseries should be at least 300 m² in size to produce at least 5,000 tree seedlings per annum.

2.1.3. Implement rainwater harvesting techniques in Agna plains at the lower reaches of Hanlé Wadi – including the use of semi-circular half-moon designs and contour earthen bunds – to support the re-establishment of *Acacia* woodland species.

2.1.4. Engage with local communities and community leaders to prevent livestock grazing in the restoration sites.

2.1.5. Fencing, signaling and/or guarding of at least 10 ha in each project area to protect the restoration site from degradation.

2.1.6. Develop and implement a campaign to increase public awareness of the potential to reduce vulnerability to floods, droughts and desertification by conserving and restoring vegetation on wadi banks. This will include training local communities on techniques for restoration of *Acacia* woodlands.

Output 2.2. Restored mangroves in central coastal zones of Tadjourah

This output focuses on the restoration of degraded mangrove areas to create buffer zones that will protect coastal communities from erosion, storm surges and sea level rise. Currently, there are no remaining mangroves in Tadjourah as a result of degradation by camel grazing, tree cutting and sedimentation⁹¹. A restoration project was undertaken approximately a decade ago in this location but was undermined as a result of damage by grazing camels. The LDCF project will consequently undertake restoration of at least 10 ha of degraded mangroves in Kalaf in Tadjourah. The restoration of mangroves areas will

⁹¹PERSGA, 2004. Status of mangroves in the Red Sea and Gulf of Aden, PERSGA Technical Series 11.

include measures to prepare the sites for replanting, including light dredging of sediment from tidal canals as well as removal of deadwood, solid waste and other litter from the restoration areas. The recovery of restored mangroves will be further promoted by enclosing the planting areas with fences to exclude grazing livestock. Local communities will be provided with training to collect and propagate mangrove seeds. This will include the establishment of six mangrove seedling nurseries in the vicinity of the proposed restoration sites. These activities will be supported by a campaign that will increase the awareness of local communities of the potential to reduce their vulnerability to climate-related hazards through the restoration of degraded mangrove areas.

The activities to be implemented under Output 2.2 are:

2.2.1. Prepare the sites selected for mangrove restoration by dredging to remove excess sand that blocks tidal flow.

2.2.2. Clean up the sites selected for mangrove restoration (i.e. remove dead wood and solid wastes) prior to restoration activities.

2.2.3. Establish five mangrove nurseries of at least 400 m² each to produce at least 6,000 seedlings each per annum.

2.2.4. Establish five fenced areas of 4,000 m² for mangrove replanting.

2.2.5. Train local communities to undertake mangrove restoration activities in the selected restoration sites, including how to collect seeds and carry out replanting.

2.2.6. Develop and implement a campaign to increase public awareness of the multiple benefits generated by mangrove ecosystems, including: i) reduced vulnerability of local communities to climate change effects; ii) increased productivity of fisheries; and iii) increased tourism potential in these areas.

Component 3: Sustainable and resilient livelihoods

Alternative scenario

Component 3 will increase the climate resilience of livelihoods practiced by communities in the project areas through two complementary approaches, namely: i) integrating climate-resilient techniques into traditional livelihood practices; and ii) introducing climate-resilient alternative livelihoods. The climate-resilient livelihood practices that will be developed in Component 3 (i.e. agropastoralism, apiculture, aviculture and handcraft) will be complemented by a public awareness campaign on the benefits of these alternative livelihood practices. Diversification of livelihoods will increase the resilience of the local communities by reducing reliance on a narrow range of resources such as pasture lands. Consequently, this diversification will decrease poverty and food insecurity.

153. Production of fodder plants and crop plants will be intensified at the project's intervention sites under this component. This intensification will be partly achieved by supporting farmers to purchase and implement comprehensive farmer packages⁹² – built around state-of-the-art drip irrigation technologies – that generate sustainable agribusinesses. These packages will include high-quality agricultural inputs, equipment, agricultural extension support, microfinance loans, financial training, and insurance against extreme weather events. The adaptation rationale underpinning this intervention with farmer

⁹² See for example the Amiran Farmer's Kit at www.amirankenya.com and <http://www.amirankenya.com/poster2.pdf>.

packages is: i) drip irrigation will conserve water supplies to manage increasing frequencies of drought and rates of evaporation; ii) hybrid seeds – selected according to the specific climatic conditions of a site – will be used to track changes in climate through time; iii) appropriate pesticides will be applied to specific pests and diseases that are spreading as a result of climate change; iv) insurance will protect farmers against flooding and wind damage; and v) agricultural extension support will focus on climate-smart agricultural techniques. The farmer packages will be designed such that the capital investment can be repaid to the bank or microfinance institution over a period of 3 years. The sustainability of the LDCF investment – in the form of profitable small enterprises – will consequently be evident before the end of the project.

154. Gender considerations will be a strong focus of all activities in this component. Two livelihoods, namely aviculture and handcraft, have been shown to be particularly successful in Djibouti when managed by women. The LDCF resources will consequently be used to train women in the development of those livelihoods in the project areas. In so doing, the project will contribute to improving the quality of life for women in rural areas of Djibouti (see Section 3.11).

Outcome 3: Livelihoods that are sustainable, climate-resilient and contribute to maintaining ecosystem services.

Output 3.1. Productive oasis ecosystems that provide livelihoods and ecosystem services.

155. This output focuses on increasing the climate resilience of rural communities in Hanlé and Tadjourah by diversifying and increasing their income streams. Firstly, their main economic activity, pastoralism, will be strengthened by establishing large agricultural plots (i.e. 10 ha) that will provide each family with half a hectare of highly productive land for fodder production. Secondly, local community livelihoods will be climate-proofed by planting a wide range of plant species that are resilient to drought and salt tolerant. Three categories of climate-resilient species will be planted: i) diverse vegetable and fruit crops (e.g. onions, carrots, beetroots, red peppers, chili, melon); ii) fodder species (i.e. *Panicum* spp., *Chloris* spp., *Crotalaria* spp., *Poaceae* spp. and *Macroptilium*); and iii) fruit trees (i.e. guava *Psidium* spp., date palm *Phoenix dactylifera*, mango *Mangifera* spp.). Additionally, the perimeter of these plots will be planted with trees providing shade, protection against wind and NTFPs. These trees include Nile tamarisk (*Tamarix nilotica*) and neem (*Azadirachta indica*). Training on the use of rainwater harvesting technologies to increase water infiltration surrounding the agropastoral plots will also be undertaken. An example of an agropastoral plot to be established using LDCF resources is presented in Appendix 10. Such plots will greatly increase the food security of rural communities at the project sites.

156. The combination of several new economic opportunities – relating to livestock, crops, fodder and NTFP commercialisation from agropastoral plots – will assist local communities in being more sedentary as opposed to relying on nomadic pastoralism. This is seen as advantageous by the local communities. Two types of training will be provided to the agropastoralists: i) training of trainers will be conducted in demonstration agropastoral plots⁹³; and ii) a learning-by-doing campaign will be conducted using the agropastoral plots with support from the trainers. Additionally, options for increasing access to finance from local banks and microfinance institutions will be investigated by a finance specialist. Microfinance loans will, for example, facilitate the investment of local communities in marketing and transport of the goods produced through their agropastoral plots.

⁹³ Demonstration agropastoral plots used in the training will be selected according to their productivity and the diversity of plant species cultivated.

157. Additionally to the construction and restoration of large agropastoral plots, the LDCF resources will be used to support the agropastoralists outside of the LDCF-funded plots. Indeed, microloans opportunities to purchase comprehensive farmer's packages will be investigated. Therefore, local banks or microfinance institutions will be incentivised to provide loans to an estimate of 15 farming families per project areas. Such incentives could include risk-sharing facilities and/or subsidising the purchase price. Each of the farmer's packages will include: i) high-quality inputs of a portable plastic greenhouse, appropriate drip irrigation piping, hybrid seeds selected for the specific climatic conditions of the intervention site, slow-release fertilizers, appropriate pesticides for the pests and diseases that are likely to proliferate under climate change conditions, and a sterile growing medium chosen for the specific crops being grown; ii) agricultural extension support to train the farmers on how to use the equipment and grow the crops; iii) finance from local banks and/or microfinance institutions to facilitate purchases of the farmers' packages in the community; iv) financial and business training to manage cash flow and the loans; and iv) insurance to protect against extreme weather events. This financial investment of the farmers will ensure that drip irrigation equipment is used to develop a business with appropriate financial accounting systems and business structures in place to ensure its profitability and thus sustainability beyond the termination of the LDCF project. Furthermore, financial and business training will be provided to develop a spirit of entrepreneurship will be inculcated into the project beneficiaries under this activity.

158. The LDCF resources will also be used to train farmers in traditional agropastoral plots⁹⁴ on climate-resilient agropastoral practices and the use of rainwater harvesting techniques will be provided to enable at least 30 families using these traditional systems to increase the climate resilience of their livelihoods. Additionally, state-of-the-art drip-irrigation systems appropriate for small-scale agricultural areas will be provided to optimise the use of water resource for their irrigation.

The activities to be implemented under Output 3.1. are:

3.1.1. Construct and rehabilitate agropastoral plots in Hanlé. This activity will include: i) construction of at least 8 ha of agropastoral plots for 16 families in Dinamali; and ii) rehabilitation of agropastoral plots in Kouidi Koma (8 ha for 32 families) and Liliya bouri (10 ha for 42 families). Construction of agropastoral plots will include cemented stone perimeter walls, planting of vegetation to protect against wind and sedimentation, and construction of cement compost basins.

3.1.2. Construct at least three agropastoral plots of 10 ha each in Tadjourah (one each in Kalaf, Darkenlé and Ad bouya). Construction of agropastoral plots will include the same measures outlined in Activity 3.1.1.

3.1.3. Select the beneficiaries of the project who will grow crops, fodder plants and other beneficial trees and plants on 0.5 ha of land within the LDCF-financed agropastoral plots according to a vulnerability assessment.

3.1.4 Provide agropastoral families with farmer input kits comprising suitable fodder and crop species.

⁹⁴ Traditional agropastoral plots are agropastoral plots of 300 to 500 m² that rely on rainwater harvesting structures (e.g. wells) for irrigation. Hence, they differ from the LDCF-financed agropastoral plots of at least 8 ha and irrigated by a borehole (non-depending on rainwater harvesting)

3.1.5. Design and implement learn-by-doing campaigns to increase public awareness of the potential to increase climate resilience, soil fertility and pest resilience through improved agropastoral management and establishment of small businesses focusing on irrigation. Learn-by-doing campaigns will be conducted in: i) the agropastoral plots constructed/rehabilitated by the project; ii) the agropastoral plot of the agriculture cooperative of Hanlé; and iii) the traditional agropastoral plots at Ambabo in Tadjourah (17 farms of 300 m² to 500 m² each).

3.1.6. Train 'trainers' at successful agropastoral plots already established in other sites. Three 'trainers' will be selected from the identified LDCF project beneficiaries (see Activity 3.1.3), who will transfer lessons learned at existing agropastoral plots to the remaining project beneficiaries. This activity will also include the identification of existing and successful agropastoral plots.

3.1.7. Cultivate drought- and salt-tolerant tree seedlings in nurseries for planting in the agropastoral plots.

3.1.8. Select and train one agropastoralist per plot in animal husbandry, including elementary veterinary care and feeding techniques for livestock to increase the productivity of pastoralism activities.

3.1.9. Train local communities on techniques for preserving agropastoral products after harvest.

3.1.10. Facilitate the purchase of comprehensive farmer's packages including drip irrigation system for at least 15 families in both Hanlé and Tadjourah, and provide financial and business training to the beneficiaries.

3.1.11. Implement rainwater harvesting techniques to reduce soil erosion and increase water infiltration, including: i) straw mulching; ii) planting selected grass species; and iii) the construction of stone rows, *Zai* and contour earthen bunds. These interventions will be implemented at various sites including Kafimlou, Alimoli douloul, Dawano and Rareyta in Hanlé, and Ad bouya, As Hougouba, Ikiyta and Darkenlé in Tadjourah.

3.1.12. Undertake a financial assessment to identify potential sources of finance, such as provision of micro-loans, to support agropastoralists and develop agropastoral value chains.

Output 3.2. Increased, diversified and resilient livelihoods from the introduction of sustainable alternative economic development activities

159. The activities of this output will increase the range of opportunities local communities have to meet their food needs and generate income. Economic activities in the rural areas of Hanlé and Tadjourah are mostly limited to pastoralism. The recent drought events have resulted in considerable livestock loss to pastoralists. Some pastoralists have changed their livelihoods to charcoal production using *Prosopis*. However, this activity threatens indigenous tree species as it promotes the planting of *Prosopis* species, which is an alien invasive species. Stakeholder consultations have shown that there is a will to change from charcoal production to agropastoral activities if the opportunity arises. As a result, the LDCF resources will be used to propose to local communities alternative livelihoods to charcoal and pastoralism that are major causes of ecosystem degradation in the project areas.

160. Apiculture has already been introduced in an agropastoral plot in Hanlé. There are two hives and another two are planned. No honey has been collected yet because they do not have the protective clothing. The LDCF resources will be used to provide three hives in each of the six agropastoral plots to introduced this economic activity. The planting of *Acacia*

mellifera and *Acacia nilotica* which provide pollen for bees will be promoted in the surrounding areas.

161. Aviculture has already been successfully introduced in the Barah area. This activity has focused on women who were given chickens from Ethiopia that are adapted to local conditions (including tolerance to heat and resilience to common pests and diseases of domestic fowls). Consuming chicken and eggs is not part of Djiboutian culture. However, the effects of climate change have raised the willingness of local communities to adopt new economic activities. Accordingly, aviculture activities will be introduced in the six agropastoral plots of the project. Material and training will be provided to support local communities with the development of this new activity.

162. Handicraft is practiced by women in both Hanlé and Tadjourah. The Women Association of Tadjourah (AFT⁹⁵) creates different products from doum palm (*Hyphaene thebaica*) leaves such as mats, gifts and decorations. Those products are sold in several cities in the country including Djibouti Ville. The doum palm leaves come mostly from Hanlé where this type of craft is also practiced. Women in Hanlé make a narrower range of products restricted mainly to mats. This narrow range is a result of their limited technical knowledge. Similarly, they do not have the technical knowledge to produce a variety of pigments for the decoration of their product – in contrast to the women of the AFT. The LDCF resources will therefore be used to fund the training of 30 women of Hanlé by two women from the AFT or from another appropriate handicraft association.

163. The LDCF project will use the protocols and results of the CPEC and AF projects to develop sustainable microfinance options which are appropriate to the intervention sites. Institutions and stakeholders with experience related to development of microfinance options in rural areas, including the Agriculture and Agro-Industries Department' (OSAN) of the AfDB, will be consulted during the design of LDCF microfinance activities. The project will also undertake a campaign to increase awareness of the potential to support the development of sustainable livelihoods by increasing access to microfinance. Stakeholders to be targeted by this campaign will include commercial banks, bureaux de change, insurance companies and other microfinance institutions. The LDCF project will increase the capacity of local communities to access microfinance through sedentarisation and development of micro-credit opportunities (see Activities 3.1.12 and 3.2.4).

Activities to be implemented under Output 3.2 are:

3.2.1. Provide agropastoralists with training and equipment to practice apiculture. This will include providing (or facilitating purchase of) hives (three hives per agropastoral plot), as well as training in beekeeping and honey production.

3.2.2. Provide agropastoralists with training and equipment to practice aviculture. This activity will include building chicken coops, providing (or facilitating purchase of) climate-resilient chickens for egg production (nine females and one male adapted to dry climates per agropastoral household) and training in aviculture.

3.2.3. Facilitate the training of the women's association of Hanlé by the women's association of Tadjourah on producing crafts derived from the doum palm tree.

3.2.4. Use microfinance from local banks and/or microfinance institutions to upscale apiculture, aviculture and handicraft production at the project sites to develop sustainable,

⁹⁵ Association des femmes de Tadjourah

profitable small enterprises. See output 3.1 for further details on the approach of developing such businesses.

Component 4: Institutional capacity for adaptive development and communities' resilience

Alternative scenario

164. Component 4 of the LDCF project will complement the diverse economic activities that will be introduced or reinforced in Component 3. Accordingly, the primary focus of Component 4 is the development of the appropriate institutional and technical capacity for adapting Djibouti's agricultural and water sector to climate change at both the national scale and the local scale. As a result, the LDCF resources will have long lasting effects on the Djibouti economy long after the termination of the project.

165. The activities of Component 4 at a national scale will include: i) improving coordination between the different implementation units within MHUE, MAPE-RH and project management teams supporting ongoing and future environmental projects in the country; and ii) providing support for the integration of climate-resilience and EbA into the country's development projects. The activities of the LDCF project at a local scale under this component include: i) increasing technical capacity through the dissemination of knowledge about climate change and the sustainable use of natural resources; and ii) increasing institutional capacity through the creation of local cooperatives and committees to promote, train and maintain the new climate resilient livelihoods developed.

Outcome 4: Increased capacity of institutions and communities to adapt to climate change

Output 4.1. Increased institutional and technical capacity of local and national government

166. An inter-ministerial Climate Change Committee (CCC) was created in 1999 by the Ministry of the Interior. In 2004, the CCC was included in a broader committee named the Sustainable Development Committee (see section 2.4). However, none of these committees have met on a regular basis. Consequently, the LDCF project will host an inter-ministerial workshop with the objective being to: i) supervise the activities related to climate change at the national scale; ii) provide a general orientation on the activities that should be implemented in the field of climate change; and iii) ensure the coordination of the institutional structures in charge of the problems related to climate change.

167. Numerous development projects are being conducted in Djibouti. The majority of those projects have the primary objective of increasing water availability and reducing poverty. However, the likelihood of meeting these goals is limited by minimal communication between the projects' implementation teams. Hence, the LDCF project will develop communication and knowledge sharing between the ongoing projects in related sectors such as water, agriculture, fisheries and environment. Additionally, technical capacity will be further increased through studying the activities' results on the resilience of local communities to climate change. This research will provide evidence-based knowledge to guide the replication and upscaling of project activities. This research project will be conducted by Djiboutian students (i.e. PhD and MSc students).

168. The LDCF project will further increase the technical capacity of the government to reduce population vulnerability to climate change through supporting the development of an EWS in Tadjourah. The World Bank has allocated funding through the GFDRR to increase Djibouti's resilience to extreme climate events. The CERD is responsible for using the funds to implement an EWS project in Djibouti. The first phase of the project started early in 2011 and will finish in December 2013. The first two years focused on implementing an EWS in Djibouti Ville. The second phase to begin in January 2014 will expand the EWS to the other

areas that are particularly vulnerable to floods. Tadjourah Ville is one of these areas where in July 2013 flooding washed away a school nearby Marsaki wadi. The LDCF project will contribute to the development of the EWS in Tadjourah Ville. It will achieve this by providing training on EWS data interpretation and corresponding decision-making to the risk management units established by the EWS project as well as the local associations identified by the NDRAMS.

The activities to be implemented under Output 4.1 are:

4.1.1. Develop research projects to assess the mid- and long-term costs and benefits of the LDCF project interventions (one PhD and two Masters students).

4.1.2. Train **at least 15** policy-makers within government department related to water, agriculture, natural resource and energy management to nationally upscale climate change considerations, including climate change vulnerability and risk assessments into development planning⁹⁶.

4.1.3. Train the risk management unit and local associations associated with the NDRAMS project to interpret climate information and respond appropriately to early warning messages.

4.1.4. Organise annual workshops for a multi-ministry climate change committee, including representatives of relevant government departments (**at least 30 individuals**), to promote national upscaling of EbA interventions.

4.1.5. Develop and promote an online platform to share information that will support the design, implementation and management of current and future projects on climate change adaptation in Djibouti. Resources that will be available through the online platform will include: i) technical studies; ii) progress reports of the environmental projects that are being implemented in Djibouti (see section 2.7); iii) maps of the different project intervention sites; and iv) evidence-based guidelines to enhance the climate resilience of project activities.

Output 4.2. Increased institutional capacity at local levels for adaptation to climate change using an ecosystem-based approach

169. The activities in this output will increase both institutional and technical capacity of local communities. The training provided in Output 3.1 will be further strengthened by the establishment of agropastoral management committees at the project sites that will further disseminate the knowledge on climate resilient agropastoral practices and support their application. Additionally, those committees will be responsible for ensuring the appropriate management of the water resources and maintenance of water pumping systems. These committees will also provide training for the maintenance of water pumping, storage and distribution equipment funded under Component 1. One committee will be established per agropastoral plot. In addition, agropastoral cooperatives will be established within the communities at each intervention site. These cooperatives will be provided with support to facilitate the marketing of agropastoral products. Furthermore, the establishment of cooperatives will allow agropastoralists to negotiate the procurement of goods and services – such as agricultural inputs and transport – at a more cost-effective rate.

⁹⁶ A multi-ministry committee for risk management was created on presidential order. The committee's brief includes extreme climate events. It has been convened four times a year since 2012. The list of attendees to this committee will likely be used to organise the training workshop of activity 4.1.2.

170. During stakeholder consultations, the need for a means of transport of the agricultural products to cooperatives or cities was raised frequently. Hence, a financial/logistics expert will be contracted to investigate different options for agropastoralists to get their agricultural produce to market timeously.

171. LDCF resources will also be used to increase the capacity of MHUE to conduct public awareness campaigns on how climate change is affecting Djibouti. Additionally, school teachers will be trained on appropriate adaptation technologies for managing climate change effects in Djibouti. The teachers will be encouraged to transfer this information to their students. This activity will be implemented in collaboration with the Centre of Research, Information and Production of the National Education ministry (CRIPEN⁹⁷).

The activities to be implemented under Output 4.2. are:

4.2.1. Establish management committees at each agropastoral plot in Hanlé and Tadjourah. These committees will be trained on: i) date-palm tree planting; ii) cultivation of drought- and salt-tolerant plants; iii) efficient irrigation techniques; iv) sustainable agriculture practices in each of the agropastoral sites; v) water management; and vi) maintenance of water pumping systems.

4.2.2. Establish an agropastoral cooperative in Tadjourah, and support the existing agropastoral cooperative in Hanlé. These cooperatives will develop systems/mechanisms to enable individual agropastoralists to: i) sell their crops at higher prices; ii) reduce the costs of marketing; iii) procure agricultural inputs and transports; and iv) transport their agricultural produce to market.

4.2.3. Support MHUE to conduct public awareness campaigns on climate change and the activities of on-going climate change adaptation projects, including the LDCF project.

4.2.4. Develop and implement a campaign to increase the awareness of school children to climate change. Information to be relayed will include: i) climate change trends in Djibouti; ii) negative effects of climate change; iii) the importance of functioning ecosystems as buffers against such negative effects; and iv) the value of adaptation technologies such as improved management of agropastoral systems.

3.4. Intervention logic and key assumptions

172. The LDCF project interventions will: i) strengthen the technical and institutional capacity of the government to include climate change adaptation in national strategies, development planning and externally funded projects (see Sections 2.6 and 2.7); and ii) increase the capacity of local communities to adapt to climate change. The latter will be achieved in three ways. Firstly, the project will invest in hard infrastructural measures, such as flood protection gabions, boreholes and storage dams, to reduce the impact of climate-related hazards such as floods and drought on local communities. Secondly, the project will promote the sustainable management of natural resources such as water and Acacia woodland ecosystems to generate ecosystem goods and services through an EbA approach. Thirdly, the project will promote climate-resilient livelihood alternatives through, for example, the cultivation of a range of climate-resilient crops and fodder species in agropastoral plots. Stakeholders will benefit from training, awareness raising and pilot demonstrations of both EbA and infrastructure-based adaptation options. Information generated by the project, including through long-term studies of the effects of project

⁹⁷ Centre de Recherche, Information et Production de l'Education Nationale.

interventions, will be collated and disseminated in order to support replication and upscaling of project activities. These project interventions are a hybrid approach to climate change adaptation, which includes both the EbA approach advocated by UNEP combined with a conventional infrastructure-based approach to reducing vulnerability to climate-related hazards. These interventions are aligned with UNEP’s Program of Work as well as priorities identified in Djibouti’s NAPAs.

173. The LDCF project was designed in consultation with multiple local stakeholders, and all interventions will involve a participatory approach. This participation of local communities, local associations such as AAH, and relevant governmental institutions (see Sections 2.5 and 5) has led to buy-in and ownership of the project by all stakeholders. This local support will enhance the long-term sustainability of the interventions.

174. The proposed project interventions are considered to be ‘low regret’ or ‘no regret’ options, because activities will be of benefit regardless of the severity of climate change effects. For example, activities that focus on ecosystem restoration and improved pastoral management (Outcomes 2 and 3, respectively) will benefit biodiversity and generate multiple ecosystem goods and services. Furthermore, activities which focus on building technical capacity of the government and local communities (Outcome 4) will support improved planning and management, particularly with respect to natural resources and ecosystems.

175. Assumptions underlying the project design include:

- project activities are unlikely to be undermined by extreme climate events during implementation;
- there is sufficient surface water and groundwater available, with appropriate management, to meet local demand;
- infrastructure installed will be safe from theft and vandalism;
- local communities will accept alternative livelihoods and land-uses proposed by the project if they participate in developing project interventions;
- governmental institutions will have sufficient capacity to support project activities;
- sufficient national financial resources will be available to maintain project interventions in the long term;
- there is sufficient technical capacity to conduct the preliminary studies and to design the implementation of activities;
- baseline project activities will be implemented as planned;
- climate change adaptation priorities are unlikely to be undermined by national emergencies or civil unrest; and
- large-scale infrastructural developments that would disrupt project activities will not take place within the project areas during project implementation.

3.5. Risk analysis and risk management measures

	Description of risk	Potential consequences	Mitigation measures/ management response	Risk category	Probability & impact (1–5)
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1	Disruption of project implementation by extreme climate events, e.g. floods.	Economic loss or physical damage to infrastructure is a challenge to the timely implementation of project activities.	<ul style="list-style-type: none"> • A baseline project will implement an EWS in the intervention sites. • Meteorological predictions will be taken into account during the planning of critical construction phases of hard infrastructure and agropastoral plots. • Intervention sites will be planned to minimise flooding threat to materials and equipment. 	Economic	P=2 I=4
2	Insufficient surface water availability, groundwater availability and rate of groundwater recharge to meet local demand.	The project is unable to address communities' water requirements in Hanlé and Tadjourah.	<ul style="list-style-type: none"> • All available information on surface water and groundwater will be collated and project activities will be adapted if necessary. For example, water treatment and recycling may need to be prioritised over borehole construction. 	Social, environmental	P=3 I=3
3	Vandalisation or theft of infrastructure such as pumps and solar panels.	Project activities are delayed. Additional finance is required to repair/replace equipment, and budget allocation to other activities is reduced.	<ul style="list-style-type: none"> • Equipment and infrastructure installations will be fenced and permanently fixed in place with cement. 	Economic	P=2 I=2
4	Limited support or buy-in from local communities for sustainable resource management practices.	Unsustainable use of natural resources continues, leading to further degradation of ecosystems. Productivity of agropastoral plots is not sustained in the long term.	<ul style="list-style-type: none"> • Public awareness campaigns and cooperatives will demonstrate the benefits of sustainable natural resource management and facilitate the adoption of the introduced practices. 	Social, environmental	P=1 I=4

5	Limited institutional capacity of the government as a result of existing commitments to related ongoing initiatives.	Project activities are delayed as a result of other government engagements. Effectiveness of project management is reduced.	<ul style="list-style-type: none"> • The roles and responsibilities of each participating government institution will be agreed upon by institutional representatives at the validation meeting. • The CTA will provide substantial support to the project manager. This will include two to three field visits per year by the CTA to ensure that the project workplan is applied. 	Institutional	P=4 I=3
6	Insufficient national financial resources to maintain project interventions in the long-term.	Project interventions such as hard infrastructure, irrigation systems, agropastoral plots and restored ecosystems are not maintained.	<ul style="list-style-type: none"> • Local communities will be trained in maintaining agropastoral plots, irrigation systems and other interventions. • Ecotourism will be promoted to increase the economic value derived from natural ecosystems and to provide incentives to fund their protection and maintenance. 	Economic	P=3 I=4
7	Limited technical capacity to conduct preliminary studies and design the implementation of activities.	CERD is unable to complete preliminary studies, resulting in delayed implementation of project activities. Adaptation interventions are not designed appropriately.	<ul style="list-style-type: none"> • The project budget for the preliminary studies will include funds to hire international consultants to complement the CERD research team. • The CTA will provide an up-to-date literature review on the activities planned. 	Technical	P=3 I=3
8	Baseline project activities not achieved as planned.	LDCF project activities are compromised as a result of a lack of existing interventions upon which to build.	<ul style="list-style-type: none"> • To ensure that they succeed, the project will allocate additional resources to the affected activities. 	Economic	P=3 I=3
9	Climate change adaptation priorities	Project activities are interrupted. Infrastructure is damaged or lost.	<ul style="list-style-type: none"> • The project manager and CTA will keep abreast of national events and politics to 	Social, environmental	P=2 I=5

	undermined by national emergencies or civil unrest.		plan contingency activities when/if necessary.		
10	Large-scale infrastructural developments take place within project areas.	Project activities are disrupted or delayed.	<ul style="list-style-type: none"> The project manager and CTA will work with appropriate governmental agencies to ensure prioritisation of the LDCF project in the project areas. 	Institutional	P=1 I=3

3.6. Consistency with national priorities or plans

176. The proposed LDCF project is aligned with Djibouti's Poverty Reduction Strategy Paper (PRSP), which was adopted by the government in 2004. The four objectives of the PRSP are: i) support economic growth; ii) develop human resources; iii) strengthen social safety nets; and iv) modernise and promote good governance. Subsequently, the INDS was developed as a follow-up to the PRSP. It was initially developed for the period 2008–2012 but was then revised for the period 2011–2015. The INDS had the following objectives: i) support economic growth, competitiveness and employment; ii) improve access to basic social services; iii) reduce poverty and vulnerability; and iv) reinforce public governance.

177. The LDCF project supports the third objective of the INDS, to reduce poverty while mitigating social and environmental vulnerability. The proposed project activities are aligned with several of the associated INDS priorities, including, inter alia: i) promoting efficient use of surface water and groundwater in rural areas; ii) developing oasis agriculture and pastoralism; and iii) conducting risk assessments and revising emergency and disaster response plans. Accordingly, the LDCF project will contribute to Djibouti's ability to achieve its national development and poverty reduction targets for 2015.

3.7. Incremental cost reasoning

178. Extreme climate events have had multiple negative consequences for infrastructure, human health and economic development in Djibouti. Since 1980, the frequency of droughts has increased from ~one drought per decade to ~one drought every 2.5 years. Data analyses conducted for the NAPA and the INC indicate that this frequency will continue to increase. Furthermore, the frequency and severity of floods is expected to increase. The cumulative effect of frequent, intense droughts and floods is likely to reduce soil infiltrability and stability. In addition, the increasingly brief periods for recovery between extreme events will exacerbate the negative effects on local communities. The LDCF project will consequently increase the resilience of highly vulnerable communities in Djibouti to droughts and floods. In addition, it will increase the climate resilience of activities implemented by ongoing baseline projects.

179. The project will also increase the technical capacity of Djibouti's government to integrate climate change adaptation into development planning. This will enhance resilience to climate change at a national scale. Additionally, the project will contribute to the expansion of the country's EWS. The expansion of this system will reduce the effects of extreme climate events on livelihoods, infrastructure and health.

180. Component 1: This component will increase the resilience of local communities to extreme climate events, particularly droughts and floods, within the two project areas – Hanlé and Tadjourah. Droughts and limited freshwater availability in particular are currently hindering development in these areas in sectors such as human health, manufacturing and agriculture. At present, however, there is limited information relating to water resources – including location, quantity and quality of surface water and groundwater – to support the effective development of the project areas’ water resources. Additionally, there is insufficient technical capacity to improve methods of capturing and storing rainwater such as the use of percolation wells to collect water from periodic wadi flows. The information generated by the project’s technical studies related to water availability and use will therefore have multiple benefits for socio-economic development in the project areas.

181. Communities in Hanlé and Tadjourah are particularly vulnerable to floods. This is partly attributable to widespread deforestation and degradation of watersheds, which results in an increased severity of floods. The communities’ vulnerability is exacerbated by a lack of adequate early warning systems. The LDCF project will therefore complement the activities of CERD by supporting the development of an EWS within the project areas. The project will also introduce hard and soft infrastructure to reduce the effects of floods. The LDCF project will allocate US\$ 3,697,900 million from project funds and US\$ 7,119,000 million in cofinancing to this component.

182. Component 2: Djibouti’s woodlands and mangroves have been degraded by activities such as uncontrolled livestock grazing and woodfuel harvesting, which has led to widespread desertification. Restored *Acacia* woodlands and mangroves will provide multiple ecosystem goods and services that will increase the resilience of the project areas’ rural communities to climate change. For example, restored *Acacia* woodlands will stabilise soil and therefore reduce soil erosion and desertification. They will also promote soil infiltrability and thereby reduce the frequency and effects of floods. The LDCF project’s proposed EbA interventions will therefore: i) restore natural ecosystems in Hanlé and Tadjourah; and ii) conduct a public awareness campaign on the importance of conserving and restoring these ecosystems. The public awareness campaign will promote the sustainability of the restoration activities. The LDCF project will allocate US\$ 1,170,100 from project funds and US\$ 2,253,000 in cofinancing to this component.

183. Component 3: The principal economic activities in Djibouti’s rural areas are pastoralism and subsistence agriculture. These livelihoods are heavily dependent on rainfall and are therefore particularly vulnerable to the effects of climate change. Furthermore, water quality (as well as availability) is predicted to decrease as a result of climate change. This will exacerbate poverty and will negatively affect food security and human health.

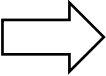
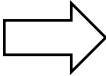
184. The LDCF project will improve the resilience of the project areas’ local communities to climate change by promoting food security, livelihood diversification and economic development. Livelihood diversification will be achieved by, *inter alia*: i) introducing a variety of climate-resilient crop species to agropastoral plots; ii) supporting sustainable alternative economic activities such as apiculture, aviculture and craftwork; iii) improving the management of traditional activities, particularly pastoralism; and iv) develop sustainable microfinance options and raise awareness of the potential to support the development of sustainable livelihoods by increasing access to microfinance. The LDCF project will allocate US\$ 1,357,000 from project funds and US\$ 2,612,000 in cofinancing to this component.

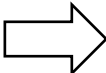
185. Component 4: Limited institutional and technical capacity at both the government and community levels hinders both the improvement of socio-economic conditions and the development of climate change adaptation interventions. Furthermore, multiple ongoing initiatives such as those outlined in Section 2.6 will be undermined by the negative effects of climate change. Additionally, at a local scale there is limited knowledge on the sustainable

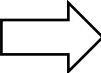
use and management of natural resources, or of potential alternative livelihood practices. Communities therefore require extensive support to increase their resilience to climate change.

186. The LDCF project will build institutional and technical capacity to appropriately prioritise climate change adaptation actions and investments. The project will do this by, *inter alia*: i) establishing a knowledge-sharing network; ii) running workshops and public awareness campaigns on climate change adaptation; iii) establishing and supporting local, regional and national committees and cooperatives to coordinate climate change adaptation; and iv) conducting research on the costs and benefits of climate change adaptation interventions. This will support the technical capacity of Djibouti's government and communities to adapt to climate change, as well as the integration of climate change adaptation into ongoing donor projects in Djibouti. The LDCF project will allocate US\$ 658,000 from project funds and US\$ 1,267,000 in cofinancing to this component.

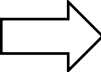
Table 5: Comparison of the business-as-usual situation and alternative adaptation scenarios.

	Business-As-Usual		Adaptation alternative scenario
Problem description	<p>The aridity of Djibouti results in its water sector having limited capacity to meet the requirements of the country. Because most farmers do not have irrigation systems and rely on rainfall, Djibouti's national water insecurity greatly reduces agricultural productivity. Additionally, natural ecosystems are being degraded by multiple factors including overgrazing by livestock. Ecosystem degradation is exacerbated by demographic factors. These include the rapid rate of rural-urban migration and the settling of nomadic pastoralists, which both further increase the localised demand for natural resources.</p> <p>Djibouti is particularly vulnerable to climate change-induced hazards that are already detrimental to water, environment, agriculture and health sectors. Climate change is predicted to increase the frequency and duration of drought periods. Additionally, the frequency and intensity of floods will increase. These climate change effects are expected to further decrease water availability and increase desertification. Furthermore, the government has little institutional and technical capacity to integrate adaptation to climate change into development planning.</p>		<p>To address this problem, UNEP is facilitating the implementation of an adaptation project in Djibouti, based on priorities identified during the NAPA process. The interventions of the LDCF project will thus include: i) increasing water availability and resilience to floods; ii) restoring natural ecosystems; iii) developing and diversifying climate-resilient livelihoods; and iv) increasing the capacity of the government to integrate adaptation into development planning.</p>
Project outcomes	<p>Outcome 1</p> <ul style="list-style-type: none"> • There is a large deficit between water availability and population needs. • There are an insufficient number of boreholes, dams and reservoirs to adequately distribute water resources in Hanlé and Tadjourah. • The existing infrastructure is often inappropriate for local community circumstances. • Local communities have a limited capacity to operate and maintain borehole equipment. 		<p>The LDCF project will contribute to improve the baseline situation, particularly in relation to increase of water availability, by:</p> <ul style="list-style-type: none"> • Constructing hard infrastructures (levees and gabion walls) to increase the resilience of local communities to droughts. • Constructing hard infrastructures (boreholes and water-reservoirs) to increase the availability of water for drinking and irrigation. • Undertaking hydrological studies to generate

	<ul style="list-style-type: none"> • There is limited information on groundwater location, quantity and quality as well as surface water availability, particularly in Hanlé. 		<p>detailed information on the availability and quality of ground and surface water in Hanlé and Tadjourah.</p> <ul style="list-style-type: none"> • Installing hydrological monitoring equipment to increase the availability of information related to water resources. • Investigate the potential for use of grey water for irrigation.
	<p>Outcome 2</p> <ul style="list-style-type: none"> • Djibouti ecosystems are extremely degraded because of multiple causes including overgrazing by livestock, inappropriate agricultural practices and deforestation woodfuels such as charcoal and firewood. • Degradation of ecosystems such as mangroves and <i>Acacia</i> woodlands results in negative effects such as increased soil erosion, desertification, sedimentation of surface waters and invasion by alien plant species. • The observed consequences of desertification include a reduction in species diversity and plant biomass as well as a reduction in the overall productivity of the dryland ecosystems. 		<p>The LDCF project will contribute to improve the baseline situation, particularly in relation to restoration of natural ecosystems, by:</p> <ul style="list-style-type: none"> • Engaging with local communities to restore degraded ecosystems that provide a buffer against the predicted effects of climate change with climate-resilient species. • Removing <i>Prosopis</i> (invasive species) in the identified restoration areas and replanting <i>Acacia</i> woodlands (buffer ecosystem). • Replanting mangrove ecosystem in a pilot site. • Increasing ground water recharge through ecosystem restoration and the use of rainwater harvesting technologies such as <i>Zai</i>, contoured earthen bunds and ridged contours. • Increasing local communities' awareness on the importance of <i>Acacia</i> woodlands and mangroves.
	<p>Outcome 3</p> <ul style="list-style-type: none"> • Increased frequency and severity of drought has led to the decline of pastoral resources and the loss of a large proportion of Djibouti's national livestock herd, particularly in Hanlé. • Poverty in Djibouti is often a result of communities having few livelihood options. • The development of alternative livelihoods is hindered by limitations in technical knowledge 		<p>The LDCF project will contribute to improve the baseline situation, particularly in relation to development of climate-resilient livelihoods, by:</p> <ul style="list-style-type: none"> • Establishing large agropastoral plots that will provide each family with half a hectare of productive land for fodder production. These agropastoral plots will be climate-proofed by planting a wide range of plant species that are drought resilient and salt tolerant.

	<p>and capital investments.</p> <ul style="list-style-type: none"> • There is a significant gender inequality in rural areas. • There is limited financial opportunities for agropastoralists. 		<ul style="list-style-type: none"> • Implementing comprehensive farmer packages – including best available drip irrigation technologies – that generate sustainable agri-businesses. • Training agropastoralists on climate-resilient agropastoral practices. • Training local communities in the development of apiculture. • Training of women in the development of aviculture and handcraft activities. • Developing and implementing a public awareness campaign on the benefits of these alternative livelihood practices. • Diversifying local livelihoods to increase the resilience of the local communities by reducing reliance on a narrow range of resources such as pasture lands. • Diversifying agricultural practises will decrease poverty and increase food security. • Training agropastoralists on the use of rainwater harvesting technologies to increase water infiltration surrounding the agropastoral plots. • Investigating options to increase access of agropastoralists to finance from local banks and microfinance institutions.
	<p>Outcome 4:</p> <ul style="list-style-type: none"> • There is limited coordination between the various environmental projects in Djibouti, which is partly attributable to a lack of knowledge-sharing systems. • A Climate Change Committee was created in 1999 according to a presidential decree⁹⁸. 	<hr/>	<p>The LDCF project will contribute to improve the baseline situation, particularly in relation to institutional capacity for climate change adaptation, by:</p> <ul style="list-style-type: none"> • Hosting an inter-ministerial workshop of the Climate Change Committee. • Improving coordination between ongoing and future environmental projects in the country by

⁹⁸ Order n°99-0277/PR/MATETA.

	<p>However, regular meetings of this committee are not held.</p> <ul style="list-style-type: none"> • The main factor constraining the success and expansion of agropastoralism is the limited technical capacity and knowledge of the local communities 		<p>developing communication and knowledge sharing.</p> <ul style="list-style-type: none"> • Studying the activities' results on the resilience of local communities to climate change to guide the replication and upscaling of project activities. • Supporting the development of an EWS in Tadjourah. • Increasing the institutional capacity of local communities through the establishment of agropastoral management committees and agropastoral cooperatives to promote, develop and maintain the new climate resilient livelihoods developed. • Investigating different options for agropastoralists to get their agricultural production to market timeously. • Increasing the capacity of MHUE to conduct public awareness campaigns on how climate change is affecting Djibouti. • Training teachers in primary schools on appropriate adaptation technologies for managing climate change effects in Djibouti.
Cost	Business-As-Usual Development Cost		Additional Adaptation Cost
Financed by	GoD, AfDB, IDB, GFDRR		LDCF

3.8. Sustainability

187. The project was developed in consultation with a wide range of relevant stakeholders (see Appendix 11, 12 and 13), including local communities. Hence, each activity of the proposed LDCF project corresponds to needs identified by stakeholders and project beneficiaries. This approach has promoted buy-in of all project stakeholders, thereby increasing the sustainability of the project interventions. The same approach will be used during the implementation process by continually consulting the stakeholders, particularly on decisions related to the implementation of concrete, on-the-ground interventions. In this way, local communities will have a sense of ownership of the natural and hard infrastructure constructed using LDCF resources.

188. The sustainability of the project interventions will be further strengthened through several other measures. Firstly, the capacity of relevant line ministries and local communities will be increased by providing training on climate change adaptation (see Activity 4.1.2 and 4.1.3). This training will enable the government of Djibouti to plan and implement future adaptation programmes thereby increasing the capacity of stakeholders. And it will enable local communities to initiate their own small-scale adaptation interventions, such as EbA measures and development of alternative livelihoods. The sustainability of the project's interventions will also be supported by undertaking a comprehensive study to assess potential sources of finance – including provision of microloans – and identify opportunities to fund the replication and upscaling of successful project activities by local communities. The financial assessment study may also include assessments of the potential for microfinance loans to support interventions which could not be included within the LDCF project. For example, the study will assess the potential for local communities to use microfinance loans to market and transport goods produced through agropastoral plots. Details which will be investigated by the financial assessment study will include inter alia: i) availability of collateral to access loans; ii) detailed cash flow analyses for various project interventions; iii) calculations of return on investment and payback period; iv) capacity of different micro-finance institutions (MFIs) to provide interest rates that would promote specific interventions; v) potential size of the market (to incentivise MFIs); and vi) financial literacy and capacity of farmers to manage their businesses and pay back loans. Secondly, an upscaling strategy for the project interventions will be developed (Activities 4.1.2 and 4.1.4) by the project. This strategy will advocate sustained government investments in project activities beyond the project implementation period. Thirdly, economic opportunities to develop value chains will be investigated and the commercial viability of a range of alternative livelihoods will be analysed (Activity 3.1.12 and 3.2.4). This will include an assessment of potential opportunities to encourage private sector participation in the development of alternative livelihoods. Several research projects will also be conducted to assess the mid- and long-term economic costs and benefits of project interventions (Activity 4.1.1). These economic analyses will leave a legacy of credible information that can be used by the private sector to take investment decisions and establish profitable businesses based on project interventions. This will promote the project interventions beyond the lifespan of the project. Finally, PhD and Masters students will provide rigorous scientific results on the effects of project interventions on the resilience of local livelihoods.

189. The project will prioritise the appointment of national consultants wherever possible in order to support the development of national capacity. International consultants will be appointed only where local expertise is limited. In such cases, national and international consultants will work together to develop national expertise in EbA and promote the sustainability of project activities.

190. The project design is aligned with the INDS and NAPA priorities. This increases the likelihood of the project interventions being upscaled by the Government of Djibouti to other areas. In addition, the cost-effectiveness of the proposed interventions as well as the buy-in

of local communities will encourage the government to include EbA in national development planning.

3.9. Replication

191. The project will develop a strategy for upscaling based on information generated during implementation and lessons learned. Suitable sites for upscaling of project activities will be identified and communicated to the appropriate regional authorities. Additionally, an online platform will be developed and a Project Managers Coordination Working Group (PMCWG) will be established. The online platform will share information on climate change adaptation (see Activity 4.1.5) and the PMCWG will improve the coordination and dialogue between the ongoing projects (see Section 4). Lastly, the upscaling of the project activities will be promoted by the project's legacy of enhanced institutional and technical capacity of agencies such as MHUE and MAPE-RH.

3.10. Public awareness, communications and mainstreaming strategy

192. The climate-resilience of the local communities of Djibouti is poor primarily as a result of limited knowledge on climate change. For instance, settlements are often built in wadis, resulting in significant vulnerability to floods. To address local communities' limited knowledge, the LDCF project will increase public awareness of climate change and adaptation techniques. To this end, the project will conduct several public awareness campaigns. These campaigns will focus on the following topics: i) climate change effects, predicted trends and the role of ecosystems in reducing vulnerability (Activities 2.1.6, 2.2.6, 4.2.3 and 4.2.4); ii) sustainable use of resources such as water and pastures (Activity 4.2.1); and iii) the promotion of alternative livelihoods that are climate-resilient (Activities 3.2.1, 3.2.2 and 3.2.3). The public awareness campaigns will include articles in national and local newspapers as well as pamphlets which will be distributed to communities in the project areas.

193. To further build the capacity of local communities to adapt to the effects of climate change, the public awareness campaigns will also target schoolchildren. For example, as part of Activity 4.2.4, teachers and schoolchildren will be presented with information on climate change adaptation at least once in each of the intervention sites.

Stakeholders from ongoing environmental projects and programmes in Djibouti and neighbouring countries will be alerted to the online network established in Activity 4.1.5. The online network will promote the replication of successful practices and lessons learned from the LDCF project. These lessons will be applicable in many arid African countries, such as Somalia, Ethiopia, Sudan, Niger, Nigeria, Chad, Eritrea and Mali. The LDCF project's successes and lessons learned will also be disseminated on international climate change networks such as weADAPT, AAKNet and the Climate and Development Knowledge Network.

3.11. Environmental and social safeguards

194. The UNEP checklist for Environment and Social Safeguards (Appendix 16) reflects the positive environmental and social impacts of the project. The Project Manager, Chief Technical Advisor and UNEP Task Manager will be responsible for overseeing adherence to these guidelines throughout the implementation of the project.

195. To meet the objectives of the LDCF project, the adaptation priorities in Hanlé and Tadjourah require hard infrastructure (i.e. levees and gabion walls) in addition to EbA interventions. This combination of hard and soft infrastructure will provide protection from floods. Environmental Impact Assessments will be conducted by a national research unit

before construction commences to minimise any negative environmental effects caused by hard infrastructure.

196. In 2002, Djibouti adopted a National Policy for the Integration of Women into Development (SNIFD⁹⁹). The objective of this policy is to allow women to attain positions of responsibility and participate actively in development and decision-making processes. Priority will be given to health, education, decision-making and women's livelihoods. Accordingly, gender equity will be considered in each activity of the LDCF project. Gender equity is defined here as the equal participation of men and women in project activities. The proportion of women involved in the project activities will be monitored during project implementation. Stakeholder decisions relating to project activities will only be made with a sufficient representation of women in attendance¹⁰⁰. Furthermore, the material and training for two of the alternative livelihoods introduced by the LDCF project in Component 3 will be provided to women (i.e. handcraft and aviculture).

SECTION 4: INSTITUTIONAL FRAMEWORK AND IMPLEMENTATION ARRANGEMENTS

197. The proposed LDCF project will be implemented over a four-year period according to the workplan (see Appendix 4). Implementation will be informed by lessons learned from the first LDCF project. During the inception phase, the following activities will be conducted: i) the inception workshop (which ensures that all existing and new stakeholders are briefed on the project and that a detailed workplan is developed in a participatory manner) will be held; ii) the EIA and the SEA will be conducted according to national legislation to ensure that none of the activities proposed in the project will have detrimental effects on the environment; iii) the baseline study will take place to measure the baseline of the indicators selected for project outputs and AMAT; iv) hydrological and pedological studies will be undertaken by CERD¹⁰¹ to further inform the design of a range of interventions at specific sites; and v) additional project stakeholders will be identified and engaged with (for example, stakeholders involved in initiatives such as OSS¹⁰²).

198. A Task Manager (TM) will be appointed by UNEP to provide technical assistance and oversight to project activities. The TM will formally participate in the following: i) Project Steering Committee (PSC) meetings (one per year); ii) mid-term review and final evaluation; iii) clearance of half-yearly and annual reports; and iv) technical review of project outputs.

Management structure

199. The management structure of the project is presented in Figure 5. The mandate of the PSC will include: i) overseeing project implementation; and ii) reviewing annual workplans and project reports. All decisions taken by the PSC will be communicated to the PMU. The PSC will meet twice a year.

200. The MHUE will be the National Executing Agency (NEA). As such, the MHUE will hire a full-time Project Manager (PM). The PM will conduct the day-to-day management of the project. He/she will operate in a transparent and effective manner in line with all budgets

⁹⁹ Politique Nationale pour matière d'intégration de la femme dans le développement.

¹⁰⁰ A minimum of 30% of women will be necessary.

¹⁰¹ The government of Djibouti has requested that CERD (a local research institution) conduct the technical (e.g. hydrological and pedological) studies required during the early stages of the proposed LDCF project.

¹⁰² The hydrological study that will be conducted as part of activity 1.2.2 will be developed in collaboration with the IGAD managers in order to strengthen complementary of the activities of both projects and benefit from their experience in water resource mapping, assessment and monitoring.

and workplans. In addition, the PM will report on a weekly basis to the TM and the CTA on the progress and challenges encountered on the ground during the execution of activities. In particular, the PM will: i) provide on-the-ground information for UNEP progress reports; ii) engage with stakeholders; iii) organise the PSC meetings; iv) provide technical support to the project, including measures to address challenges to project implementation; and v) participate in training activities, report writing and facilitation of consultant activities that are relevant to his/her area of expertise. A National Technical Assistant (NTA) will support the PM. The responsibility of the NTA will be to promote: i) the timely execution of activities and achievement of expected deliverables; ii) dialogue between stakeholders particularly at a local level; and iii) participation of local communities in project activities. To achieve this, the NTA will be required to visit the intervention sites regularly. The NTA will also work in close collaboration with the PM (see Appendix 18).

201. International experts will be hired to complement local expertise. Consultant descriptions are included in the budget notes (see Appendix 1). ToRs for project staff are presented in Appendix 18.

202. A Project Managers' Coordination Working Group (PMCWG) will be established to improve the coordination and dialogue between the ongoing projects including the LDCF one implemented by UNEP. The PMCWG will include the CTA, the managers of the baseline projects and representatives of other aligned projects (see Section 2.7). Meetings for the PMCWG will be held twice a year. They will work towards: i) promoting synergy between projects; ii) preventing the duplication of activities; iii) optimising the effects of the project interventions; and iv) sharing lessons learned.

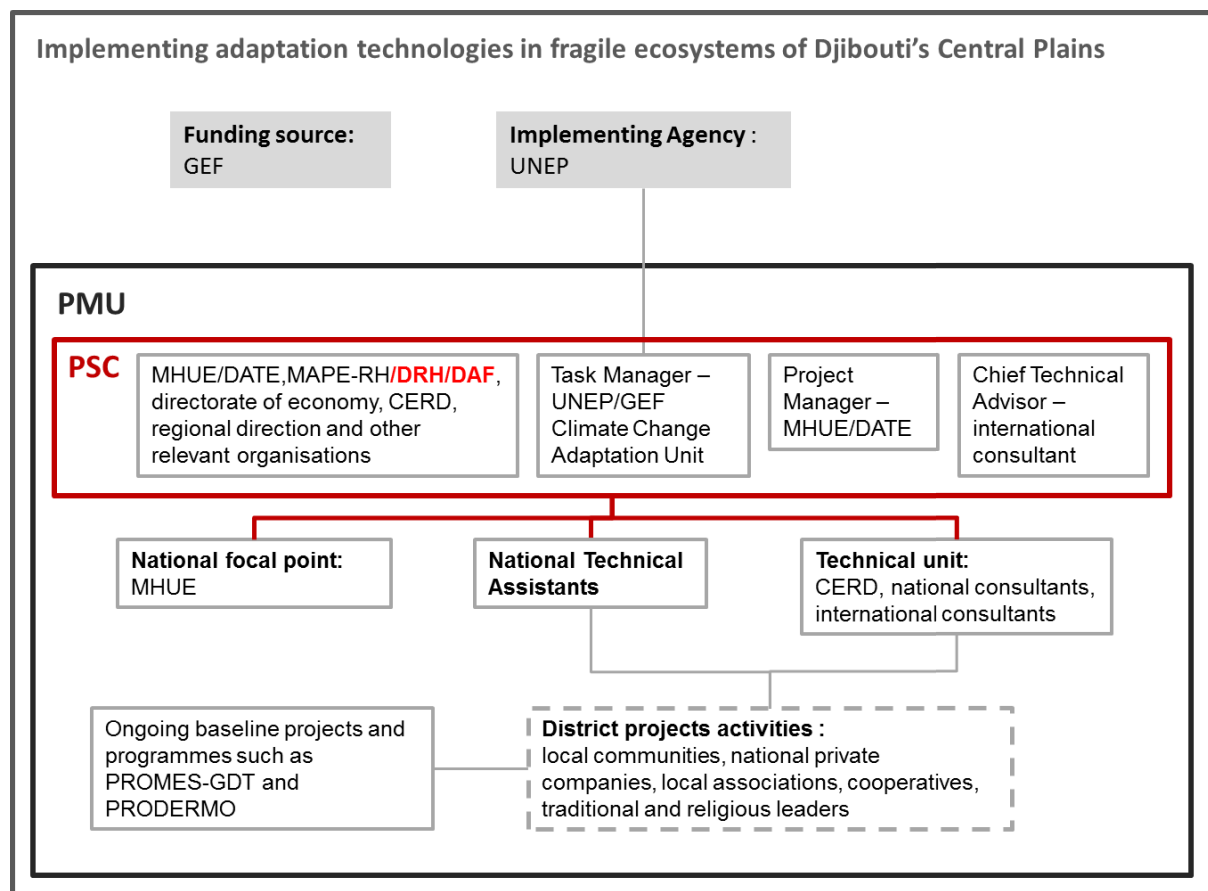


Figure 5: The LDCF project's management structure.

SECTION 5: STAKEHOLDER PARTICIPATION

203. The implementation strategy for the proposed LDCF project includes extensive stakeholder participation. Details of the stakeholder participation during the PPG phase are provided in Appendix 11 and 12. A stakeholder engagement plan to be used during the implementation phase will be developed during the project inception workshop. Stakeholders will be consulted throughout the implementation phase to ensure that they: i) have an understanding of the project's outcomes; ii) take ownership of the project through engaging in planning, implementing and monitoring of the specific interventions; and iii) communicate to the public in a consistent, supportive and effective manner.

204. The mechanisms for stakeholders consultations will include: i) initial meetings of regional government (i.e. regional head and regional advisor committees of Dikhil and Tadjourah regions) and national government institutions (i.e. MHUE, MAPE-RH) during the inception workshops (see Section 2.5); ii) consultation meetings with the baseline projects' coordinators and co-financing institutions (see Section 2.6); iii) consultation meetings at the local scale with CBOs and NGOs (e.g. AAH, AFT) and community leaders; and iv) consultation meetings in local communities with the beneficiaries of the LDCF project.

205. Local communities' involvement will be encouraged through the creation of committees (one committee per agropastoral plot). Community leaders from the intervention sites will be invited to every meeting of the Project Management Committee. These activities will build upon existing relationships and agreements with local communities. Relevant local associations such as the AAH have, for example, already agreed to participate in the implementation of the project.

206. Stakeholder consultations will be divided into three phases during the four-year project implementation period. Firstly, the 'mobilisation phase' will run during the first year of the project, during which time: i) specific details of the activities and local management structures for implementation will be developed; ii) partnerships for action will be forged; and iii) the extent of stakeholder engagement in each activity will be developed and signed off by the relevant stakeholders. Secondly, the 'consultative implementation' phase will run during the main implementation phase of the LDCF project. This phase involves applying the stakeholder involvement plan to each of the activities defined during the first phase. Thirdly, the 'completion and upscaling' phase will start during the last year of project implementation. This phase will support the sustainability of the project by transferring responsibility for management of the LDCF project's investments to the stakeholders. The specific stakeholders to be engaged at each stage of project implementation are presented in Table 6.

Table 6. Relevant partners and stakeholders identified for engagement by project outcome.

<u>Output 1.</u> Outcome s	<u>Output 1.2.</u> Activitie s	<u>Output 1.3.</u> Stakeholders	<u>Output 1.4.</u> Federal Sector	<u>Output 1.5.</u> Directorate of Land Use and the Environment (MHUE)	<u>Output 1.6.</u> Directorate of Rural Hydraulics (MAPE-RH)	<u>Output 1.7.</u> Directorate of Livestock Management (MAPE-RH)	<u>Output 1.8.</u> Directorate of Fishing (MAPE-RH)	<u>Output 1.9.</u> Ministry of Economy	<u>Output 1.10.</u> National Meteorological Service (ANM)	<u>Output 1.11.</u> Risk Management Secretary (Ministry of Interior)	Social Development Agency of Djibouti (ADDS)	National Office for Water Management and Treatment of Djibouti (ONEAD)	Office National de Tourisme de Djibouti	Centre de Recherche, d'Information et de Production de l'Education Nationale (CRIPEN)	Directorate of Overseas Financing Leveraging Eco-tourism and the Private Sector	Technical research institutions	CERD	Regional sector	Regional Advisory Committee of Tadjourah	Regional Advisory Committee of Hanlé	Local sector	Key local associations	Traditional and religious leaders
Outcome 1: The negative impacts of droughts and floods are reduced or averted	Construction of hard infrastructure (1.1.2 to 1.2.8)			X	X							X							X	X			
	Climate modelling, Hydrogeological and pedological studies (1.2.1 to 1.2.3)			X	X	X			X			X					X		X	X			
	Feasibility studies (1.1.9, 1.2.4)			X	X				X								X		X	X			
Outcome 2: The negative impacts of droughts and floods are reduced or averted	Acacia woodlands restoration activities (2.1.1 to 2.1.5)			X					X								X		X	X		X	X
	Mangrove restoration activities (2.2.1 to 2.2.5)			X			X		X				X				X		X			X	X
	Public awareness campaigns and training (2.1.6, 2.2.6)			X					X					X					X	X		X	X
Outcome 3: Livelihoods that are sustainable, climate-resilient,	Agropastoral plots construction (3.1.1 to 3.1.4, 3.1.7, 3.1.11)			X	X	X			X								X		X	X		X	X
	Training of the agropastoralists (3.1.5, 3.1.6, 3.1.8,			X															X	X		X	X

and contribute to maintaining ecosystem services	3.1.9)																				
	Training on alternative livelihoods (3.2.3&4)			X		X		X					X	X			X		X	X	X
	Public awareness campaign (3.1.7, 3.2.1) & knowledge sharing (3.2.2)			X	X	X							X				X	X		X	X
	Microfinance opportunities development (Activities 3.1.10, 3.1.12 and 3.2.4)										X										
Outcome 4: Increased capacity of institutions and communities to pro-actively adapt to climate change	Capacity building in line ministries and research projects (4.1.1&4)			X	X	X	X	X	X			X	X	X	X		X		X	X	
	Establishment of an online platform for knowledge sharing (4.1.5)			X	X	X	X	X	X			X	X	X	X		X				
	Establishment of committees, farmers' cooperatives and financial investment options. 4.2.1&2)			X		X		X				X						X	X		X
	Climate change public awareness campaigns (4.2.3&4)			X					X	X				X				X	X		

SECTION 6: MONITORING AND EVALUATION PLAN

207. The proposed LDCF project will follow UNEP standards for monitoring, reporting and evaluation of processes and procedures. Additionally, substantive and financial project reporting requirements are summarised in Appendix 7. Reporting requirements and templates are an integral part of the UNEP legal instrument to be signed by the executing agency and UNEP.

208. The project's M&E plan is consistent with the GEF Monitoring and Evaluation Policy. Furthermore, the Project Results Framework presented in Appendix 3 includes SMART indicators for each expected outcome as well as mid-term and end-of-project targets. These indicators will be the main tools for assessing project implementation progress and whether project results are being achieved. The deliverables and benchmarks included in Appendix 5 will complement the indicators. Furthermore, the means of verification and the costs associated with obtaining the information to track the indicators are summarised in Appendix 7. Other M&E related costs are also presented in the Costed M&E Plan and are fully integrated in the overall project budget.

209. The M&E plan will be reviewed during the project inception workshop. This process will enable project stakeholders to understand their roles and responsibilities in terms of M&E. Indicators and their methods of verification will also be adjusted at the inception workshop if necessary. In addition, day-to-day project monitoring is the responsibility of the project management team. Project partners will have to be responsible for collection of specific information to track the indicators. It is the responsibility of the Project Manager to inform UNEP of any delays or difficulties faced during implementation. This communication allows the appropriate support or corrective measures to be implemented with minimal delay.

210. The project Steering Committee will receive periodic reports on progress and will make recommendations to UNEP concerning the need to revise any aspects of the Results Framework or the M&E plan. The Task Manager in UNEP-GEF is responsible for confirming that the project meets UNEP and GEF policies and procedures. The Task Manager will also review the quality of draft project outputs, provide feedback to the project partners, and establish peer review procedures to enhance the quality of scientific and technical outputs and publications.

211. Project supervision will take an adaptive management approach. Accordingly, the Task Manager will develop a project supervision plan at the inception of the project. This plan will be communicated to the project partners during the inception workshop. The emphasis of the Task Manager supervision will be on outcome monitoring. However, he/she will also be responsible for project financial management and implementation monitoring. Additionally, progress on delivering the agreed project global environmental benefits will be assessed with the Steering Committee at agreed intervals. Project risks and assumptions will be regularly monitored both by project partners and UNEP. Furthermore, risk assessment and rating is an integral part of the Project Implementation Review (PIR). The quality of project monitoring and evaluation will be reviewed and rated as part of the PIR. The main financial parameters will be monitored quarterly to promote cost-effectiveness.

212. The project will be reviewed or evaluated at mid-term (tentatively in January 2016 as indicated in the project milestones). The purpose of the Mid-Term Review (MTR) or Mid-Term Evaluation (MTE) is to provide an independent assessment of project performance at mid-term, to analyse whether the project is on track, what problems and challenges the project is encountering, and which corrective actions are required so that the project can achieve its intended outcomes by project completion in the most efficient and sustainable way. In addition, it will verify information gathered through the GEF tracking tools. The Project Steering Committee will participate in the MTR or MTE and develop a management

response to the evaluation recommendations along with an implementation plan. It is the responsibility of the UNEP Task Manager to monitor whether the agreed recommendations are being implemented. The MTR will be managed by the UNEP Task Manager at DEPI. The MTE will be managed by the Evaluation Office of UNEP. The Evaluation Office will determine whether a MTE is required or whether an MTR is sufficient.

213. An independent terminal evaluation (TE) will take place at the end of project implementation. The Evaluation Office of UNEP will be responsible for the TE and liaise with the UNEP Task Manager at DEPI throughout the process. The TE will provide an independent assessment of project performance (in terms of relevance, effectiveness and efficiency), and determine the likelihood of impact and sustainability. It will have two primary purposes: (i) to provide evidence of results to meet accountability requirements, and (ii) to promote learning, feedback, and knowledge sharing through results and lessons learned among UNEP and executing partners (the MHUE in particular). The direct costs of the evaluation will be charged against the project evaluation budget. The TE report will be sent to project stakeholders for comments. Formal comments on the report will be shared by the Evaluation Office in an open and transparent manner. The project performance will be assessed against standard evaluation criteria using a six-point rating scheme. The final determination of project ratings will be made by the Evaluation Office when the report is finalised. The evaluation report will be publically disclosed and will be followed by a recommendation compliance process.

214. The GEF tracking tools are attached as Appendix 23. These will be updated at mid-term and at the end of the project. In addition, the tracking tools will be made available to the GEF Secretariat along with the project PIR report. As mentioned above the mid-term and terminal evaluation will verify the information of the tracking tool.

SECTION 7: PROJECT FINANCING AND BUDGET

7.1. Overall project budget

	LDCF Funds	Co-Financing	Total Costs
Total project cost (US\$)	7,360,000	14,170,000	21,530,000

Table 1: A breakdown of total project financing.

7.2. Project co-financing

	US\$	%
LDCF Funds	7,360,000	34.0
Co-financing		
National government (PIP for INDS implementation including funds for PROMES and PRODERMO projects)	12,800,000	59.0
UNEP	1,370,000	0.7
Total	21,530,000	100

Table 2: Breakdown of project financing by funder.

7.3. Project cost-effectiveness

215. The adaptation interventions to be implemented through the LDCF project will restore natural capital and increase agricultural productivity in the project target areas. This in turn will reduce the vulnerability of local communities living at project intervention sites in Hanlé and Tadjourah. The adaptation interventions are no-regret¹⁰³ and low cost with concrete, tangible benefits. As part of the development of the INC and NAPA, multi-criteria analyses were undertaken to prioritize adaptation interventions according to their potential for positive effects on economic development, social capital and environmental management. Cost-effectiveness was a criterion used to prioritize the allocation of resources. The actions proposed by the NAPA are therefore not only the most urgent and most pressing, but have also been assessed to be cost-effective. The adaptation interventions to be implemented through the LDCF project are prioritized in the NAPA – see Section 2.1. As such, the interventions are already identified as cost-effective by the Government of Djibouti.

216. The potential for natural infrastructure to provide adaptation services is gaining increased attention at national and international levels. This is because there is an urgent need to find tractable, flexible, cost-effective adaptation interventions that reduce vulnerability under rapid anthropogenic climate change. The project's EbA interventions – including mangrove restoration in Tadjourah, woodland restoration in Hanlé Plains and expansion/establishment of agropastoral plots in both target areas – are listed among the 400 different adaptation measures identified as cost-effective in the UNEP-GEF McKinsey Report¹⁰⁴ on the Economics of Climate Change Adaptation. The ecosystem services generated by restoring ecosystems are varied and difficult to value, however, there is growing evidence of the cost-effectiveness of such investments in natural capital¹⁰⁵.

217. An economic analysis of EbA and engineering options for climate change adaptation was undertaken based on the outcomes of an adaptation project in Lami, Fiji, implemented by UNEP, UN-HABITAT, SPREP and the Lami Town Council¹⁰⁶. This study included assessments of the costs and benefits of measures based on EbA options, engineering options and a hybrid approach which includes both 'hard' engineering and 'soft' EbA interventions. This analysis demonstrated that EbA options are at least twice as cost-effective as hard engineering options (benefit:cost ratio of ~US\$ 10.50 compared to ~US\$ 4.80). However, the same cost-benefit analysis indicated that EbA measures in isolation are less effective measures for avoidance of damages relative to hard engineering measures (EbA measures are estimated to reduce damages by up to 12-25% compared to estimated 25-50% damage avoidance for engineering measures). The analysis also investigated hybrid approaches to climate change adaptation which included complementary EbA and engineering measures. Analysis of hybrid adaptation options indicated that adaptation strategies which combined both EbA and engineering options, irrespective of the proportional emphasis on EbA relative to engineering, were likely to reduce damages by

¹⁰³ No-regret options are those that are justified by current climate conditions and further justified when climate change is considered, e.g. pollution reduction in water supplies will be beneficial if water supplies decrease as a result of climate change. Lim, B, and E. Spanger-Siegrfried. 2004. Adaptation policy frameworks for climate change: developing strategies, policies and measures. Cambridge University Press, Cambridge, UK pp 253.

¹⁰⁴ The McKinsey Group, 2010. Shaping Climate-Resilient Development. http://www.mckinsey.com/App_Media/Images/Page_Images/Offices/SocialSector/PDF/ECA_Shaping_Climate%20Resilient_Development.pdf. [Accessed 2 September 2011].

¹⁰⁵ Jones, H.P., D. G. Hole & E. S. Zavaleta. 2012. Harnessing nature to help people adapt to climate change. *Nature Climate Change* 2: 504-509.

¹⁰⁶ SPREP, 2013. Rao N.S., Carruthers T.J.B., Anderson P., Sivo L., Saxby T., Durbin, T., Jungblut V., Hills T., Chape S. 2013. An economic analysis of ecosystem-based adaptation and engineering options for climate change adaptation in Lami Town, Republic of the Fiji Islands. A technical report by the Secretariat of the Pacific Regional Environment Programme. Apia, Samoa

25% with a benefit:cost ratio of US\$ 4.30-8.00. The report on these cost:benefit analyses noted that accurate data to estimate the economic cost of inaction at a spatially explicit level is required to determine the likely avoided damage as a result of intervention options. Furthermore, accurate cost:benefit analyses require accurate environmental and economic data to estimate the direct and indirect economic value of ecosystem services. These datasets are not available for Djibouti and as a result it is challenging for project developers to accurately determine the cost-effectiveness and likely effect of adaptation activities. It is anticipated that the long-term research undertaken through the LDCF project will contribute to increasing local knowledge and information to support the development of locally appropriate adaptation options.

218. The benefits of the adaptation interventions will be enhanced by training communities on the maintenance and improved management – relative to current management practices – of the restored ecosystems and agropastoral plots. Training will target communities at all intervention sites and management committees at each agropastoral plot in Hanlé and Tadjourah. This training will be complemented by farmer input kits (Activity 3.1.4) which will increase agricultural productivity. This will increase food security and contribute to the establishment of sustainable, alternative livelihoods. Community ownership of the project will in turn be established. This will reduce the overhead for monitoring and maintenance of the interventions and will promote sustainability of project benefits beyond the project lifespan, further enhancing the cost-effectiveness of the LDCF project interventions.

219. The LDCF project will build on existing initiatives in Djibouti which will reduce the costs for the project. For example, detailed protocols for mangrove restoration have been developed through the first LDCF project and will be used in the proposed LDCF project. The project's interventions designed to increase agricultural activities are a further example. These interventions will include the expansion of existing agropastoral plots in Kouidi Koma and Liliya Bouri. By building on current national development programmes and collaborating with ongoing, related initiatives, the project will enhance economies of scale and the cost-effectiveness of the use of LDCF resources.

220. Recent research shows that EbA is most effective as part of an overall adaptation strategy¹⁰⁷. Such a strategy would include 'hard' and 'soft' adaptation interventions. The proposed LDCF project will implement 'hard' adaptation interventions such as the construction and rehabilitation of gabion walls and boreholes. These interventions will be complemented by soft EbA interventions such as bank stabilisation, water conservation and rainwater harvesting in the target project areas. Further 'soft' interventions, such as technical and institutional capacity building of national and local stakeholders, will enhance the sustainability of the LDCF project. Examples of the benefits of this complementary approach are well documented in the international literature¹⁰⁸.

¹⁰⁷ Travers et al. 2012. Ecosystem-Based Adaptation Guidance: Moving from Principles to Practice. UNEP Working Document.

¹⁰⁸ A recent shift to integrate both hard and natural infrastructure in the Yangtze River in China has resulted in the seasonal opening of embankment sluice gates. This has restored the connections between the Yangtze River, three major lakes and their associated wetlands. Whereas dams and dykes on the Yangtze River provided water for agriculture, they also caused flooding, blocked animal migrations and degraded water-purifying vegetation, leading to eutrophication and loss of water quality. The integrated approach, including EbA interventions, has increased floodwater retention, water purification and agricultural opportunities, and has restored migration routes for spawning fish. See: Jones et al. 2012. Harnessing nature to help people adapt to climate change. Nature. Published online: 26 June 2012 | doi: 10.1038/nclimate1463.

221. Despite rapidly accumulating evidence highlighting the potential benefits of EbA, uncertainties of the cost-effectiveness do remain. This is because it is a new field of endeavor in least developed as well as developed countries. Consequently, long-term research will be conducted through the LDCF project to better understand the benefits of integrating 'hard' and 'soft' interventions. This research, undertaken by two MSc students and one PhD student, will monitor and evaluate the cost-effectiveness of the LDCF project interventions (Component 4). The findings will be used to inform which interventions should be upscaled to similar ecosystems at a national level. Lessons learned from the research, as well as from the on-the-ground adaptation interventions, will be captured and shared with stakeholders through workshops, awareness campaigns and the online platform established through Component 4. Such stakeholders include government technical staff, policy-makers, restoration practitioners, scientists, university students, school children and the general public. Informing a broad range of stakeholders of the benefits of an integrated EbA approach, thereby promoting further upscaling of EbA, will enhance the cost-effectiveness of the LDCF's overall investment in Djibouti.

SECTION 8: APPENDICES

Appendix 1: Budget by project components and UNEP budget lines

Project number:				891											Notes	
Project executing partner				Ministry of Habitat, Urbanisation and Environment (MHUE)												
Project implementation period				Expenditure by project component/activity						Expenditure by calender year						
From: 01/03/2014				Outcome 1	Outcome 2	Outcome 3	Outcome 4	PM	M&E	Total	Year 1	Year 2	Year 3	Year 4		Total
To: 01/03/2018																
UNEP Budget Line																
10	PERSONNEL COMPONENT															
	1100		Project personnel													
		1101	National project manager (48 months @ \$2000/month)					96 000		96 000	24 000	24 000	24 000	24 000	96 000	
		1199	Sub-total	0	0	0	0	96000	0	96000	24000	24000	24000	24000	96000	
	1200		Consultants													
		1201	International specialist in hydrology (121 days @ \$500/day; 5 flights @ \$2500/flight; 70 days in-country @ \$166/day - costs split between Activities 1.1.2 to 1.1.8)	80 000						80 000	30 000	20 000	20 000	10 000	80 000	
		1202	International specialist in renewable energy (32 days @ \$500/day; 1 flights @ \$2500/flight; 14 days in-country @ \$166/day)	20 000						20 000	0	20 000	0	0	20 000	
		1203	International Chief Technical Advisor (212 days @ \$500/day; 8 flights @ \$2500/flight; 80 days in-country @ \$166/day)	40 000	40000	40000	40000			160 000	56 000	40 000	32 000	32 000	160 000	

		1204	Hydrologist (140 days @ \$125/day)	17 500					17 500	5 300	8 000	4 200	0	17 500	
		1205	Hydrogeologist (190 days @ \$125/day)	23 750					23 750	8 250	15 500	0	0	23 750	
		1206	Wastewater expert (90 days @ \$125/day)	11 250					11 250	0	6 250	5 000	0	11 250	
		1207	International specialist in EbA (89 days @ \$500/day; 4 flights @ \$2500/flight; 48 days in-country @ \$166/day - costs split between Activities 2.1.1 to 2.1.6)	60 000					60 000	15 000	15 000	15 000	15 000	60 000	
		1208	International mangrove specialist (44 days @ \$500/day; 2 flights @ \$2500/flight; 24 days in-country @ \$166/day - costs split between Activities 2.2.1 and 2.2.2)	30 000					30 000	10 000	20 000	0	0	30 000	
		1209	International climate change adaptation specialist (78 days @ \$500/day; 5 flights @ \$2500/flight; 50 days in-country @ \$166/day - costs split between Activities 2.2.3 to 2.2.6)	60 000					60 000	15 000	20 000	15 000	10 000	60 000	
		1210	National botanist (160 days @ \$125/day)	20 000					20 000	11 500	3 500	2 500	2 500	20 000	
		1211	National EbA specialist (140 days @ \$125/day)	17 500					17 500	5 000	10 000	2 500	0	17 500	
		1212	National socio-economic specialist (80 days @ \$125/day)	10 000					10 000	0	5 000	5 000	0	10 000	
		1213	National agricultural expert (60 days @ \$125/day)	7 500					7 500	0	7 500	0	0	7 500	
		1214	National mangrove specialist (220 days @	27 500					27 500	9 000	17 000	1 500	0	27 500	

			\$125/day)													
		1215	International specialist in agriculture (121 days @ \$500/day; 5 flights @ \$2500/flight; 70 days in-country @ \$166/day)			80 000				80 000	20 000	30 000	20 000	10 000	80 000	
		1216	National agricultural specialist (560 days @ \$125/day)			60 000	10 000			70 000	7 500	37 500	20 000	5 000	70 000	
		1217	National animal husbandary specialist (40 days @ \$125/day)			5 000				5 000	0	5 000	0	0	5 000	
		1218	National irrigation specialist (80 days @ \$125/day)			10 000				10 000	0	5 000	5 000	0	10 000	
		1226	National financial specialist (80 days @ \$125/day)				10 000			10 000	0	0	5 000	5 000	10 000	
		1219	National apicultural specialist (40 days @ \$125/day)			5 000				5 000	0	0	5 000	0	5 000	
		1220	National avicultural specialist (40 days @ \$125/day)			5 000				5 000	0	0	5 000	0	5 000	
		1221	National microfinance specialist (80 days @ \$125/day)			10 000				10 000	0	0	0	10 000	10 000	
		1222	National policy specialist (80 days @ \$125/day)				10 000			10 000	0	5 000	5 000	0	10 000	
		1223	National climate risk specialist (80 days @ \$125/day)				10 000			10 000	2 500	5 000	2 500	0	10 000	
		1224	National IT specialist (192 days @ \$125/day)				24 000			24 000	12 000	4 000	4 000	4 000	24 000	
		1225	National agronomist (80 days @ \$125/day)				10 000			10 000	0	5 000	5 000	0	10 000	

		1227	National education specialist (80 days @ \$125/day)				10 000			10 000	0	0	5 000	5 000	10 000	
		1228	International M&E expert (51 days @ \$500/day; 2 flights @ \$2500/flight; 28 days in-country @ \$166/day)						33 400	33 400	5 000	12 500	0	15 900	33 400	
		1299	Sub-total	192 500	272 500	215 000	124 000	0	33 400	837 400	212 050	316 750	184 200	124 400	837 400	
	1300		Administrative Support													
		1301	Financial and administrative officer (48 months @ \$1000/month)					48 000		48 000	12 000	12 000	12 000	12 000	48 000	
		1302	National Technical Assistant (48 months @ \$1000/month)					48 000		48 000	12 000	12 000	12 000	12 000	48 000	
		1303	Focal points at Tadjourah and Hanle (2 x 48 months @ \$600/month)					57 600		57 600	14 400	14 400	14 400	14 400	57 600	
		1399	Sub-total	0	0	0	0	153 600	0	153 600	38 400	38 400	38 400	38 400	153 600	
	1600		Travel on official business													
		1601	Project Manager travel					49 900		49 900	12 500	12 500	12 500	12 400	49 900	
		1699	Sub-total	0	0	0	0	49 900	0	49 900	12 500	12 500	12 500	12 400	49 900	
1999			Component total	192 500	272 500	215 000	124 000	299 500	33 400	1 136 900	286 950	391 650	259 100	199 200	1 136 900	
20			SUB-CONTRACT COMPONENT													
	2100		Sub-contracts (MOUs/LOAs for supporting organisations)													
		2101	Sub-contract for EIA	40 000						40 000	40 000	0	0	0	40 000	1
		2102	Sub-contract for the construction of gabion walls and levee in Tadjourah	869 200						869 200	200 000	469 200	200 000	0	869 200	2

		2103	Sub-contract for the construction of gabion walls in Hanle	212 000						212 000	50 000	112 000	50 000	0	212 000	3
		2104	Sub-contract for the construction of gabion walls	74 200						74 200	20 000	34 200	20 000	0	74 200	4
		2105	Sub-contract for construction of boreholes in Tadjourah	710 000						710 000	200 000	510 000	0	0	710 000	5
		2106	Sub-contract for extension of water distribution network in Tadjourah	167 500						167 500	57 500	110 000	0	0	167 500	6
		2107	Sub-contract for rehabilitation of boreholes in Hanle	329 750						329 750	139 750	190 000	0	0	329 750	7
		2108	Sub-contract for reservoirs in Tadjourah	408 000						408 000	168 000	240 000	0	0	408 000	8
		2109	Sub-contract climate change modelling studies	100 000						100 000	80 000	20 000	0	0	100 000	9
		2110	Sub-contract hydrogeological and pedological studies	460 000						460 000	260 000	200 000	0	0	460 000	10
		2111	Restoration of Acacia woodland		125 000					125 000	25 000	55 000	35 000	10 000	125 000	11
		2112	Patrolling of restored Acacia woodland areas		30 000					30 000	0	10 000	10 000	10 000	30 000	12
		2113	Preparing sites for mangrove restoration		107 500					107 500	37 500	70 000	0	0	107 500	13
		2114	Cleaning and maintenance of the mangrove restoration site		15 000					15 000	0	5 000	5 000	5 000	15 000	14
		2115	Baseline study		40 000					40 000	40 000	0	0	0	40 000	
		2116	Construct and rehabilitate agropastoral plots in Hanle			150 000				150 000	30 000	100 000	20 000	0	150 000	15

		2117	Construct agropastoral plots in Tadjourah			260 000				260 000	50 000	180 000	30 000	0	260 000	16
		2118	Farmer input kits			150 000				150 000	0	100 000	50 000	0	150 000	17
		2119	Construction and maintenance of soil and water conservation infrastructure			30 000				30 000	0	10 000	10 000	10 000	30 000	18
		2199	Sub-total	3 370 650	317 500	590 000	0	0	0	4 278 150	1 397 750	2 415 400	430 000	35 000	4 278 150	
	2200		Sub-contracts (for commercial purposes)													
		2201	Awareness raising for protection of restored areas		15 000					15000	0	7 500	7 500	0	15000	
		2202	Awareness raising on importance of Acacia woodlands to buffer against the effects of climate change		35 000					35000	0	15 000	10 000	10 000	35000	
		2203	Awareness raising on importance of mangroves to buffer against the effects of climate change		35 000					35000	0	15 000	10 000	10 000	35000	
		2204	Awareness campaign on importance of agropastoral management			70 000				70000	0	50 000	20 000	0	70000	
		2205	Long-term research projects				110 000			110 000	20 000	30 000	30 000	30 000	110 000	19
		2206	Hosting of online platform				46 000			46 000	22 000	8 000	8 000	8 000	46 000	20
		2207	Awareness campaign on climate change adaptation projects				50 000			50 000	10 000	20 000	10 000	10 000	50 000	
		2208	Awareness campaign targeting school children				40 000			40 000	0	0	20 000	20 000	40 000	21
		2299	Sub-total	0	85 000	70 000	246 000	0	0	401 000	52 000	145 500	115 500	88 000	401 000	
2999			Component total	3 370 650	402 500	660 000	246 000	0	0	4 679 150	1 449 750	2 560 900	545 500	123 000	4 679 150	

30	TRAINING COMPONENT														
	3200		Group training												
		3201	Training of communities in the use of RHTs		12 500				12 500	0	12 500	0	0	12 500	
		3202	Training of communities in the techniques of woodland restoration		20 000				20 000	5 000	10 000	2 500	2 500	20 000	
		3203	Training of communities in the techniques of mangrove restoration		15 000				15 000	0	10 000	3 500	1 500	15 000	22
		3204	Training of selected beneficiaries on improved agricultural techniques			5 000			5 000	0	5 000	0	0	5 000	
		3205	Train trainers at successful agropastoral plots			10 000			10 000	0	10 000	0	0	10 000	23
		3206	Training of communities in animal husbandary techniques			15 000			15 000	0	15 000	0	0	15 000	
		3207	Training of communities in preservation techniques			20 000			20 000	0	20 000	0	0	20 000	
		3208	Training on construction and maintenance of soil and water conservation infrastructure			66 000			66 000	0	20 000	26 000	20 000	66 000	
		3209	Training of communities in the use and maintenance of drip-irrigation systems			20 000			20 000	0	10 000	10 000	0	20 000	
		3210	Training of communities in apiculture			25 000			25 000	0	0	25 000	0	25 000	
		3211	Training of communities in aviculture			25 000			25 000	0	0	25 000	0	25 000	

		3212	Training of womens association on producing handicrafts			26 000				26 000	0	10 000	10 000	6 000	26 000	
		3213	Training on using microfinance to upscale apiculture, aviculture and handcraft production			10 000				10 000	0	0	0	10 000	10 000	
		3214	Training of policy makers to integrate climate change into development planning				75 000			75 000	0	35 000	40 000	0	75 000	24
		3215	Train risk management units and local associations to interpret received climate information				90 000			90 000	0	45 000	45 000	0	90 000	
		3216	Training of management committees at each agropastoral plot				15 000			15 000	0	5 000	10 000	0	15 000	
		3217	Training of agropastoral cooperatives				30 000			30 000	0	15 000	15 000	0	30 000	
		3218	Training of communities on financial opportunities				40 000			40 000	0	0	20 000	20 000	40 000	
		3299	Sub-total		0	47 500	222 000	250 000	0	0	519 500	5 000	222 500	232 000	60 000	519 500
	3300		Meeting/Conferences													
		3301	Annual workshop for climate change committee				40 000			40 000	10 000	10 000	10 000	10 000	40 000	2 5
		3302	Inception workshop						9 100	9 100	9 100				9 100	
		3399	Sub-total		0	0	0	40 000	0	9 100	49 100	19 100	10 000	10 000	10 000	49 100
3999			Component total		0	47 500	222 000	290 000	0	9 100	568 600	24 100	232 500	242 000	70 000	568 600
40	EQUIPMENT AND PREMISES COMPONENT															
	4100		Expendible equipment													
		4101	Office supplies					21 200		21 200	8 000	10 000	3 200	0	21 200	

	4199	Sub-total	0	0	0	0	21 200	0	21 200	8 000	10 000	3 200	0	21 200	
	4200	Non-expendable Equipment													
	4201	Solar and wind power borehole pumps	80 000						80 000	0	80 000	0	0	80 000	26
	4202	Hydrological monitoring equipment	16 000						16 000	16 000	0	0	0	16 000	27
	4203	Water distribution system	38 750						38 750	0	18 750	20 000	0	38 750	28
	4204	Nursery establishment for Acacia woodlands		24 000					24 000	14 000	10 000	0	0	24 000	29
	4205	Rainwater harvesting equipment		11 000					11 000	0	11 000	0	0	11 000	30
	4206	Fencing and signage of restored Acacia woodland areas		59 500					59 500	30 000	20 000	5 000	4 500	59 500	
	4207	Nursery establishment for mangroves		108 000					108 000	58 000	50 000	0	0	108 000	31
	4208	Fencing and signage of restored mangrove areas		62 000					62 000	0	31 000	31 000	0	62 000	
	4209	Purchasing vehicules		80 000					80 000	20 000	20 000	20 000	20 000	80 000	
	4210	Nursery establishment for agropastoral plots			45 000				45 000	15 000	30 000	0	0	45 000	32
	4211	Soil and water conservation equipment			55 000				55 000	0	15 000	25 000	15 000	55 000	
	4212	Drip-irrigation systems			60 000				60 000	0	30 000	30 000	0	60 000	33
	4213	Apiculture equipment			30 000				30 000	0	0	30 000	0	30 000	34
	4214	Aviculture equipment			20 000				20 000	0	0	20 000	0	20 000	35
	4215	Computer equipment					20 800		20 800	5 200	5 200	5 200	5 200	20 800	
	4299	Sub-total	134 750	344 500	210 000	0	20 800	0	710 050	158 200	320 950	186 200	44 700	710 050	
4999		Component total	134 750	344 500	210 000	0	42 000	0	731 250	166 200	330 950	189 400	44 700	731 250	
50	MISCELLANEOUS COMPONENT														

	5100		Operation and maintenance of equipment												
		5101	Maintaining vehicles (Costs split between Activities 2.1.1, 2.2.3 and 2.2.6)		72 000					72000	18 000	18 000	18 000	18 000	72000
		5199	Sub-total	0	72 000	0	0	0	0	72 000	18 000	18 000	18 000	18 000	72 000
	5200		Reporting costs												
		5201	Inception workshop report						3 000	3 000	3 000				3 000
		5202	Reporting costs		31 100					31 100	7 775	7 775	7 775	7 775	31 100
		5203	Audits		20 000					20 000	5 000	5 000	5 000	5 000	20 000
		5299	Sub-total	0	51 100	0	0	0	3 000	54 100	15 775	12 775	12 775	12 775	54 100
	5300		Sundry												
		5301	Communications	12000	12000	12000	12000			48 000	12 000	12 000	12 000	12 000	48 000
		5399	Sub-total	12000	12000	12000	12000	0	0	48 000	12 000	12 000	12 000	12 000	48 000
	5500		Evaluation												
		5581	Mid-term evaluation						35 000	35 000		35 000			35 000
		5582	Terminal evaluation						35 000	35 000				35 000	35 000
		5599	Sub-total	0	0	0	0	0	70 000	70 000	0	35 000	0	35 000	70 000
5999			Component total	12 000	135 100	12 000	12 000	0	73 000	244 100	45 775	77 775	42 775	77 775	244 100
99			GRAND TOTAL	3 709 900	1 202 100	1 319 000	672 000	341 500	115 500	7 360 000	1 972 775	3 593 775	1 278 775	514 675	7 360 000

Budget Notes:

1	An EIA study will be conducted at each project intervention site by a national company with demonstrated experience in undertaking EIAs and SEAs. This company will be contracted to investigate the potential environmental and social impact of each activity of the project. Based on the contract signed by the Adaptation Fund project in Djibouti with this company, the EIA and SEA has been allocated US\$ 20,000 per site.
2	The levee will be made of stone gabions and be two meters high. Gabion walls will be made of stones bound in wire, and will be built to a height of one meter. Hence, a total of 8,200 m ³ of gabion will be necessary. The price of gabion is estimated to be US\$ 106 per m ³ . This cost includes purchase of stones, wirenet and cement (US\$ 63), transport stones, wirenet and cement (US\$ 30), and labour and sub-contracting (US\$ 13).
3	See note 2
4	See note 2
5	The cost of the borehole of Kalaf is estimated to be US\$ 236,000. This cost includes the solar pump (US\$ 112,000), the exploratory borehole and water tests (US\$ 40,000), and the average cost of the equipment for a borehole that is 120 to 250 meters deep (US\$ 84,000). The cost of the boreholes of Marsaki and PK6 are estimated to be US\$ 158,000 each. This cost includes the fuel pump (US\$ 13,000), the explanatory borehole and water tests (US\$ 40,000), the average cost of the equipment for a borehole that is 120 to 250 meters deep (US\$ 85,000), and the water distribution network (US\$ 20,000).
6	The cost of the installation of the water distribution network for the boreholes of Darkenlé and Ad bouya is US\$ 83,750 each.
7	The cost of the borehole of Kouidi Koma is estimated to be US\$ 43,750. This cost includes the slab to cover the reservoir (US\$ 8,000), the water distribution network (US\$ 20,000) and reparation of the solar pump system (US\$ 15,750). The cost of the borehole of Liliya bouri is estimated to be US\$ 236,000. This cost includes the solar pump (US\$ 112,000), the exploratory borehole and water tests (US\$ 40,000), and the average cost of the equipment for a borehole that is 120 to 250 meters deep (US\$ 84,000). The cost of the borehole of Dinamali is estimated to be US\$ 50,000. The rehabilitation of this borehole will only include additional solar panels to the system already in place.
8	The cost of a reservoir of 300 m ³ is estimated to be US\$ 68,000.
9	The climate variability study will be an update of the modelling made in 2006 on temperature, precipitation and sea level rise. The expected consequences on water availability (e.g. aquifer recharge, salination, sedimentation) and on the economic sectors will be estimated as well. Its total cost is estimated to be US\$ 100,000.
10	The hydrological studies are estimated to be US\$ 100,000 for Tadjourah and US\$ 213,000 for Hanlé. The cost of the pedological studies is estimated to be US\$ 47,000 per site.
11	The cost of restoration of Acacia woodlands is estimated to be US\$ 1,250 per ha. This cost includes cleaning the sites, planting and removing Prosopis when necessary.
12	Two guard will be hired full time and paid US\$ 10 per day to patrol around the 2 planting sites that are the most vulnerable to grazing.
13	The preparation of the mangrove restoration sites includes the construction of a canal to facilitate water circulation in the planting area.

14	The mangrove areas will be initially cleaned and will be then kept clean over time by hiring full time a local individual. This person will have the role of guard as well to ensure that camels stays out of the planting areas.
15	The cost for the rehabilitation of an agropastoral plot of 8 ha is estimated to be US\$ 40,000. This cost includes the fencing, delimitating the plot and building compost basins. The estimated cost of Liliya bouri and Koudi koma is US\$ 55,000 as the rehabilitation of the irrigation equipment is necessary in these sites.
16	The construction of an agropastoral plot is estimated to be US\$ 9,300 per hectare. This cost includes fencing, removal of stones and irrigation network.
17	This cost includes seeds and transportation for 3 years. Each agropastoralist will be provided with seeds from at least 16 plants. The estimated quantity of seeds that will be provide during 3 years are: 100 kg for fodder species, 20 kg for crops species and 10 kg for fruit trees.
18	This cost includes material for digging.
19	The salary of a PhD student is US\$ 1,200 per month. US\$ 57,000 have been allocated for the PhD student salary (corresponding to 4 years) in order to increase the quality and quantity of data collected and scientific publications. Master students will get a study allowance of US\$ 400 per month for 6 months (US\$ 4,800 for two students). An estimate of US\$ 48,200 will be allocated for the field work.
20	This cost includes the creation, the maintenance, the advertisement of the website, the cost of paying for a domain name and hosting, and sub-contracting costs.
21	This cost includes one day of awareness raising in each school of the intervention sites per two trainers. It includes as well the use of medias such as the national channel, radio and newspapers in the 4 main languages.
22	Members of local communities will be trained and employed to participate in mangrove replanting activities in the proposed restoration sites. These training activities will be complementary to the awareness-raising activities in Activity 2.2.6. The estimated cost of replanting mangroves by employing and training local community members is estimated to be ~US\$ 570 per hectare. This is calculated based on the following information from the LDCF1 project manager: i) one person can plant ~50 seedlings per day; ii) recommended planting rate is 3000 seedlings; iii) therefore 10 hectares can be planted within 600 working days; and iv) the recommended daily pay for manual labour is Dji Fr. 1500 per day (US\$ 8.50). Therefore the estimated cost for 10 hectares is ~US\$ 5,700.
23	Three individuals will be selected to be the trainers for the agropastoral plots funded by the LDCF project. A total of 18 persons will thus be trained in the demonstration agropastoral plots. The estimated costs for this activity corresponds to three sessions of training for 7 days and for 6 people per session.
24	At least 15 policy-makers will be trained to upscale nationally climate change considerations and include them into development planning.
25	At least 30 government representatives will be trained during the climate change committees to implement EbA interventions including the restoring Acacia woodlands, replanting mangroves and construction climate resilient agropastoral plots.
26	The cost of solar power system that will be used in the pilot study is estimated to be US\$ 50,000. The cost of wind power system that will be used in the pilot study is estimated to be US\$ 30,000.
27	The hydrological monitoring system consists of a limnigraph and a pluviograph per project area. The estimated cost of a limnigraph is US\$ 6,000. The estimated cost of a pluviograph is US\$ 2,000.

28	The cost of water distribution network is estimated to be US\$ 38,750. This cost includes the piping system from the mosque to the garden and the irrigation system.
29	The cost for the establishment of a nursery for Acacia woodlands containing 5,000 plants is estimated to be US\$ 12,000. This cost includes the fences, labour and plants' containers.
30	The rainwater harvesting equipment includes digging tools.
31	The cost for the establishment of a nursery for mangroves 5,000 plants is estimated to be US\$ 18,000. This cost includes the fences, labour and plant containers.
32	The cost per nursery of 5,000 trees for the agropastoral is estimated to be US\$ 22,500.
33	The cost of drip irrigation system for the irrigation of 250 m2 including 25 mm PVC piping, 32 mm PVC piping, 260 m of drip pipe and a reservoir of 1000 L is estimated to be US\$ 3,000.
34	This price includes hives, protection clothes and extracting tools.

Appendix 2: Co-financing by source and UNEP budget lines

Project number:				891						
Project executing partner:				Ministry of Habitat, Urbanisation and Environment (MHUE)						
Project implementation period:										
From: 01/03/2014				GEF	National Government	UNEP-IUCN Pastoralism	UNEP Food Security	UNEP-EC SIDS	Total	
To: 01/03/2018				Grant	Grant	Grant	Grant	In kind	Grant	In kind
UNEP Budget Line										
10	PERSONNEL COMPONENT									
	1100		Project personnel							
		1101	National project manager (48 months @ \$2000/month)	96 000	-	-	-	-	96 000	-
		1199	Sub-total	96 000	0	0	0	0	96 000	0
	1200		Consultants							

		1201	International specialist in hydrology (121 days @ \$500/day; 5 flights @ \$2500/flight; 70 days in-country @ \$166/day - costs split between Activities 1.1.2 to 1.1.8)	80 000	-	-	-	-	80 000	-
		1202	International specialist in renewable energy (32 days @ \$500/day; 1 flights @ \$2500/flight; 14 days in-country @ \$166/day)	20 000	-	-	-	-	20 000	-
		1203	International Chief Technical Advisor (212 days @ \$500/day; 8 flights @ \$2500/flight; 80 days in-country @ \$166/day)	160 000	-	-	-	-	160 000	-
		1204	Hydrologist (140 days @ \$125/day)	17 500	-	-	-	-	17 500	-
		1205	Hydrogeologist (190 days @ \$125/day)	23 750	-	-	-	-	23 750	-
		1206	Wastewater expert (90 days @ \$125/day)	11 250	-	-	-	-	11 250	-
		1207	International specialist in EbA (89 days @ \$500/day; 4 flights @ \$2500/flight; 48 days in-country @ \$166/day - costs split between Activities 2.1.1 to 2.1.6)	60 000	-	-	-	-	60 000	-
		1208	International mangrove specialist (44 days @ \$500/day; 2 flights @ \$2500/flight; 24 days in-country @ \$166/day - costs split between Activities 2.2.1 and 2.2.2)	30 000	-	-	-	-	30 000	-
		1209	International climate change adaptation specialist (78 days @ \$500/day; 5 flights @ \$2500/flight; 50 days in-country @ \$166/day - costs split between Activities 2.2.3 to 2.2.6)	60 000	-	-	-	-	60 000	-
		1210	National botanist (160 days @ \$125/day)	20 000	-	-	-	-	20 000	-
		1211	National EbA specialist (140 days @ \$125/day)	17 500	-	-	-	-	17 500	-
		1212	National socio-economic specialist (80 days @ \$125/day)	10 000	-	-	-	-	10 000	-
		1213	National agricultural expert (60 days @ \$125/day)	7 500	-	-	-	-	7 500	-
		1214	National mangrove specialist (220 days @ \$125/day)	27 500	-	-	-	-	27 500	-

		1215	International specialist in agriculture (121 days @ \$500/day; 5 flights @ \$2500/flight; 70 days in-country @ \$166/day)	80 000	-	-	-	-	80 000	-
		1216	National agricultural specialist (560 days @ \$125/day)	70 000	-	-	-	-	70 000	-
		1217	National animal husbandry specialist (40 days @ \$125/day)	5 000	-	-	-	-	5 000	-
		1218	National irrigation specialist (80 days @ \$125/day)	10 000	-	-	-	-	10 000	-
		1226	National financial specialist (80 days @ \$125/day)	10 000	-	-	-	-	10 000	-
		1219	National apicultural specialist (40 days @ \$125/day)	5 000	-	-	-	-	5 000	-
		1220	National avicultural specialist (40 days @ \$125/day)	5 000	-	-	-	-	5 000	-
		1221	National microfinance specialist (80 days @ \$125/day)	10 000	-	-	-	-	10 000	-
		1222	National policy specialist (80 days @ \$125/day)	10 000	-	-	-	-	10 000	-
		1223	National climate risk specialist (80 days @ \$125/day)	10 000	-	-	-	-	10 000	-
		1224	National IT specialist (192 days @ \$125/day)	24 000	-	-	-	-	24 000	-
		1225	National agronomist (80 days @ \$125/day)	10 000	-	-	-	-	10 000	-
		1227	National education specialist (80 days @ \$125/day)	10 000	-	-	-	-	10 000	-
		1228	International M&E expert (91 days @ \$500/day; 2 flights @ \$2500/flight; 28 days in-country @ \$166/day)	53 400	-	-	-	-	53 400	-
		1299	Sub-total	857 400	0	0	0	0	857 400	0
	1300		Administrative Support							
		1301	Financial and administrative officer (48 months @ \$1000/month)	48 000	-	-	-	-	48 000	-
		1302	Secretary (48 months @ \$500/month)	24 000	-	-	-	-	24 000	-
		1303	Focal points at Tadjourah and Hanle (2 x 48 months @ \$600/month)	57 600	-	-	-	-	57 600	-
		1399	Sub-total	129 600	0	0	0	0	129 600	0

	1600		Travel on official business							
		1601	Project Manager travel	49 900	-	-	-	-	49 900	-
		1699	Sub-total	49 900	0	0	0	0	49 900	0
1999			Component total	1 132 900	0	0	0	0	1 132 900	0
20	SUB-CONTRACT COMPONENT									
	2100		Sub-contracts (MOUs/LOAs for supporting organisations)							
		2101	Sub-contract for EIA	40 000	-	-	-	-	40 000	-
		2102	Sub-contract for the construction of gabion walls and levee in Tadjourah	869 200	1 500 000	-	-	-	2 369 200	-
		2103	Sub-contract for the construction of gabion walls in Hanle	212 000	1 000 000	-	-	-	1 212 000	-
		2104	Sub-contract for the construction of gabion walls	74 200	600 000	-	-	-	674 200	-
		2105	Sub-contract for construction of boreholes in Tadjourah	710 000	2 000 000	-	-	-	2 710 000	-
		2106	Sub-contract for extension of water distribution network in Tadjourah	167 500	-	-	-	-	167 500	-
		2107	Sub-contract for rehabilitation of boreholes in Hanle	329 750	700 000	-	-	-	1 029 750	-
		2108	Sub-contract for reservoirs in Tadjourah	408 000	2 000 000	-	-	-	2 408 000	-
		2109	Sub-contract climate change modelling studies	100 000	-	-	-	-	100 000	-
		2110	Sub-contract hydrogeological and pedological studies	460 000	600 000	-	-	-	1 060 000	-
		2111	Restoration of Acacia woodland	125 000	-	-	200 000	-	325 000	-
		2112	Patrolling of restored Acacia woodland areas	30 000	-	-	100 000	-	130 000	-
		2113	Preparing sites for mangrove restoration	107 500	-	-	100 000	-	207 500	-
		2114	Cleaning and maintenance of the mangrove restoration site	15 000	-	-	-	-	15 000	-
		2115	Baseline study	40 000	500 000	-	-	-	540 000	-
		2116	Construct and rehabilitate agropastoral plots in Hanle	150 000	600 000	-	-	-	750 000	-

		2117	Construct agropastoral plots in Tadjourah	260 000	700 000	-	200 000	-	1 160 000	-
		2118	Farmer input kits	150 000		-	-	-	150 000	-
		2119	Construction and maintenance of soil and water conservation infrastructure	30 000	350 000	-	-	-	380 000	-
		2199	Sub-total	4 278 150	10 550 000	0	600 000	0	15 428 150	0
	2200		Sub-contracts (for commercial purposes)							
		2201	Awareness raising for protection of restored areas	15 000	-	-	-	-	15 000	-
		2202	Awareness raising on importance of Acacia woodlands to buffer against the effects of climate change	35 000	-	-	-	-	35 000	-
		2203	Awareness raising on importance of mangroves to buffer against the effects of climate change	35 000	-	-	-	-	35 000	-
		2204	Awareness campaign on importance of agropastoral management	70 000	200 000	-	-	-	270 000	-
		2205	Long-term research projects	110 000	-	-	-	-	110 000	-
		2206	Hosting of online platform	46 000	-	-	-	-	46 000	-
		2207	Awareness campaign on climate change adaptation projects	50 000	-	-	-	-	50 000	-
		2208	Awareness campaign targeting school children	40 000	-	-	-	-	40 000	-
		2299	Sub-total	401 000	200 000	0	0	0	601 000	0
2999			Component total	4 679 150	10 750 000	0	600 000	0	16 029 150	0
30			TRAINING COMPONENT							
	3200		Group training							
		3201	Training of communities in the use of RHTs	12 500	200 000	-	-	-	212 500	-
		3202	Training of communities in the techniques of woodland restoration	20 000		-	-	100 000	20 000	100 000
		3203	Training of communities in the techniques of mangrove restoration	15 000		-	-	100 000	15 000	100 000
		3204	Training of selected beneficiaries on improved agricultural techniques	5 000	100 000	-	-	-	105 000	-

		3205	Train trainers at successful agropastoral plots	10 000	200 000	-	-	-	210 000	-
		3206	Training of communities in animal husbandry techniques	15 000	50 000	-	-	-	65 000	-
		3207	Training of communities in preservation techniques	20 000		-	-	-	20 000	-
		3208	Training on construction and maintenance of soil and water conservation infrastructure	66 000	200 000	-	-	100 000	266 000	100 000
		3209	Training of communities in the use and maintenance of drip-irrigation systems	20 000	50 000	-	-	-	70 000	-
		3210	Training of communities in apiculture	25 000		70 000	-	-	95 000	-
		3211	Training of communities in aviculture	25 000		70 000	-	-	95 000	-
		3212	Training of women's association on producing handcrafts	26 000		60 000	-	-	86 000	-
		3213	Training on using microfinance to upscale apiculture, aviculture and handcraft production	10 000		-	-	-	10 000	-
		3214	Training of policy makers to integrate climate change into development planning	75 000		-	-	100 000	75 000	100 000
		3215	Train risk management units and local associations to interpret received climate information	90 000		-	-	50 000	90 000	50 000
		3216	Training of management committees at each agropastoral plot	15 000	20 000	70 000	-	-	105 000	-
		3217	Training of agropastoral cooperatives	30 000	20 000	-	-	-	50 000	-
		3218	Training of communities on financial opportunities	40 000		-	-	-	40 000	-
		3299	Sub-total	519 500	840 000	270 000	0	450 000	1 629 500	450 000
	3300		Meeting/Conferences							
		3301	Annual workshop for climate change committee	40 000	-	-	-	50 000	40 000	50 000
		3302	Inception workshop	9 100	-	-	-	-	9 100	-
		3399	Sub-total	49 100	0	0	0	50 000	49 100	50 000
3999			Component total	568 600	840 000	270 000	0	500 000	1 678 600	500 000
40	EQUIPMENT AND PREMISES COMPONENT									

	4100		Expendable equipment							
		4101	Office supplies	26 000	-	-	-	-	26 000	-
		4199	Sub-total	26 000	0	0	0	0	26 000	0
	4200		Non-expendable Equipment							
		4201	Solar and wind power borehole pumps	80 000	200 000	-	-	-	280 000	-
		4202	Hydrological monitoring equipment	16 000	200 000	-	-	-	216 000	-
		4203	Water distribution system	38 750	200 000	-	-	-	238 750	-
		4204	Nursery establishment for Acacia woodlands	24 000	-	-	-	-	24 000	-
		4205	Rainwater harvesting equipment	11 000	200 000	-	-	-	211 000	-
		4206	Fencing and signage of restored Acacia woodland areas	59 500	-	-	-	-	59 500	-
		4207	Nursery establishment for mangroves	108 000	-	-	-	-	108 000	-
		4208	Fencing and signage of restored mangrove areas	62 000	-	-	-	-	62 000	-
		4209	Purchasing vehicles	80 000	-	-	-	-	80 000	-
		4210	Nursery establishment for agropastoral plots	45 000	110 000	-	-	-	155 000	-
		4211	Soil and water conservation equipment	55 000	200 000	-	-	-	255 000	-
		4212	Drip-irrigation systems	60 000	100 000	-	-	-	160 000	-
		4213	Apiculture equipment	30 000	-	-	-	-	30 000	-
		4214	Aviculture equipment	20 000	-	-	-	-	20 000	-
		4215	Computer equipment	20 800	-	-	-	-	20 800	-
		4299	Sub-total	710 050	1 210 000	0	0	0	1 920 050	0
	4300		Office rental							
		4301	Office rental	19 200	-	-	-	-	19 200	-
		4399	Sub-total	19 200	0	0	0	0	19 200	0
4999			Component total	755 250	1 210 000	0	0	0	1 965 250	0
50	MISCELLANEOUS COMPONENT									
	5100		Operation and maintenance of equipment							

		5101	Maintaining vehicles (Costs split between Activities 2.1.1, 2.2.3 and 2.2.6)	72 000	-	-	-	-	72 000	-
		5199	Sub-total	72 000	0	0	0	0	72 000	0
	5200		Reporting costs							
		5201	Inception workshop report	3 000	-	-	-	-	3 000	-
		5202	Reporting costs	31 100	-	-	-	-	31 100	-
		5299	Sub-total	34 100	0	0	0	0	34 100	0
	5300		Sundry							
		5301	Communications	48 000	-	-	-	-	48 000	-
		5399	Sub-total	48 000	0	0	0	0	48 000	0
	5500		Evaluation							
		5581	Mid-term evaluation	35 000	-	-	-	-	35 000	-
		8852	Final evaluation	35 000	-	-	-	-	35 000	-
		5599	Sub-total	70 000	0	0	0	0	70 000	0
5999			Component total	224 100	0	0	0	0	224 100	0
99	GRAND TOTAL			7 360 000	12 800 000	270 000	600 000	500 000	21 030 000	500 000

Appendix 3: Results Framework

	Indicator	Baseline	Targets	Source of verification	Risks/Assumptions
Project objective: “To increase the resilience of the Djiboutian society and economy to the effects of climate change and enhance the capacity of the government to integrate adaptation into its development planning”.	1. Number of climate change adaptation training events, and number of staff trained (disaggregated by gender) in integrating climate change adaptation into development	1. No training in adaptation to climate change has been undertaken.	1. By the end of the project: <ul style="list-style-type: none"> At least two meetings of the climate change committee. At least two training workshops on risk assessments. 	1. Reports detailing training workshops including attendance sheets.	Risks: Disruption of project implementation by extreme climate events, e.g. floods. Assumptions: National financial resources are sufficient to maintain project interventions in the long-term. Sufficient technical capacity to conduct preliminary studies and design the implementation of activities. Large-scale infrastructural developments that would disrupt project activities will not take place within the project areas during project implementation. Climate change adaptation priorities are unlikely to be undermined by national emergencies or civil
	2. Number of individuals trained, (disaggregated by gender) in climate-resilient livelihoods.	2. None.	2. At least 200 individuals.	2. Reports detailing training workshops including attendance sheet.	
	3. The percentage change in vulnerability of people disaggregated by gender living in the project areas.	3. The baseline will be determined in the identified priority sites during the baseline study through a vulnerability assessment.	3a. Mid-way through the project, a 20% increase in the VRA scores. 3b. By the end of the project, a 50% increase in the VRA scores.	3. Gender-sensitive field surveys/VRA.	

						unrest.
Component 1: Protection against water-related climate change hazards.	Outcome 1: The negative impacts of droughts and floods are reduced or averted.	1. Length of gabion walls built.	1. zero m.	1. At least 7,720 m.	1. Surveys of LDCF project interventions sites.	<p>Risk: Disruption of project implementation by extreme climate events, e.g. floods.</p> <p>Assumptions: Surface water and groundwater availability is sufficient to meet local demand.</p> <p>Baseline project activities are achieved as planned.</p> <p>Sufficient technical capacity to conduct preliminary studies and design the implementation of activities.</p> <p>Infrastructure installed will be safe from theft and vandalism</p>
		2. Months during which approximately 20 m ³ water hour ⁻¹ of daylight is available for irrigation of Agropastoral plots.	2. zero * *In Koudi Koma, water is available all year round. However, the current boreholes pump water at 10 m ³ hour ⁻¹ , which is insufficient to meet irrigation demands.	2. 12 months year ⁻¹ .	2. i) Surveys of LDCF project interventions sites; and ii) review of borehole pumping records.	
Component 2: Ecosystem rehabilitation, recovery and resilience.	Outcome 2: Fragile ecosystems are productive and resilient to climate change.	1. Area of restored Acacia woodland in Hanle and Tadjourah.	1. zero ha.	1. At least 100 ha (70 ha in Hanle and 30 ha in Tadjourah).	1. Surveys of LDCF project interventions sites.	<p>Risks: Disruption of project implementation by extreme climate events, e.g. floods.</p> <p>Limited support or buy-in from local communities for sustainable resource management practices.</p>
		2. Area of restored mangroves in central coastal zones of Tadjourah.	2. zero ha.	2. At least 10 ha.	2. Surveys of LDCF project interventions sites.	
Component	Outcome 3:	1. Number of	1. In Koudi Koma,	1. 32 in Koudi Koma,	1. Surveys of LDCF	Risk:

3: Sustainable and resilient livelihoods.	Livelihoods that are sustainable, climate-resilient and contribute to maintaining ecosystem services.	households with an irrigated agropastoral plot marked by a perimeter wall.	date palm trees are grown but are not growing well as fuel is too expensive for the land to be sufficiently irrigated.	42 in Liliya Bouri, 16 in Dinamali, 20 in Kalaf, 20 in Afanoina, 20 in Ad Bouya.	project interventions sites.	<p>Limited buy-in from local communities for sustainable resource management practices</p> <p>Assumption: Sufficient technical capacity to conduct preliminary studies and design the implementation of activities.</p> <p>Surface water and groundwater availability is sufficient to meet local demand.</p>
		2. Area of irrigated agropastoral plots.	2. Koudi Koma agropastoral plot is partly irrigated.	2. By the end of the project, at least 60 ha of irrigated agropastoral plots.	2. Surveys of LDCF project interventions sites.	
		3. Number of beneficial species cultivated per agropastoral plot.	3. Zero to one(the agropastoral plots that will be restored currently have date palm trees).	3. An average of 16 different species grown on the agropastoral plots (six tree species, three fodder species and seven crops species).	3. i) Surveys of LDCF project interventions sites; and ii) review of agropastoral plots' production records.	
		4. Amount of fodder and crops produced per year.	4. zero kg.	4. An average of 80 kg ha ⁻¹ year ⁻¹ (TBC).	4. Review of agropastoral plots production records.	
		5. Number of households and communities with more secure access to livelihood assets	5. N/A	5. By the end of the project, at least 200 agropastoral families will have more secured livelihoods.	5. Gender sensitive field surveys.	
		Component 4: Institutional capacity.	Outcome 4: Increased capacity of institutions and communities to proactively adapt.	1. Number of meetings held by the climate change committee per year.	1. N/A.	
2. Average number of committee meetings per agropastoral plot.	2. N/A.			2. By the end of the project, 24 meetings hold (four per committee during the two last years of the project).	2. i) Review of training records; and ii) interview with a selection of committee members.	
3. Number of climate change adaptation training events, and	3. N/A.			3. By the end of the project: <ul style="list-style-type: none"> At least two 	3. i) Review of training day material; and ii) review of training day	

		number of staff trained (disaggregated by gender) in integration of climate change adaptation into development.		meetings of the climate change committee. <ul style="list-style-type: none"> At least two training workshops on risk assessments. At least 15 policy-makers trained. 	summary reports.	Sufficient national financial resources will be available to maintain project interventions in the long term.
		4. Number of projects sharing information through the LDCF project website.	4. N/A	4. By the end of the LDCF project, at least 15 different projects.	4. i) Review of number of visitors to the website; ii) review of number of discussions on the forum; and iii) review of number of projects that have published information on the website.	
		5. Number of research projects to access the mid and long term costs and benefits of LDCF project interventions	5. N/A	5. By the end of the project, at least 5 research projects are funded by the LDCF project.	5. Project progress reports.	

Appendix 4: Workplan and timetable

Output	Activity	Annual breakdown				Quarterly breakdown															
		Year 1	Year 2	Year 3	Year 4	Year 1				Year 2				Year 3				Year 4			
						Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Outcome 1:																					
Output 1.1	1.1.1																				
	1.1.2																				
	1.1.3																				
	1.1.4																				
	1.1.5																				
	1.1.6																				
	1.1.7																				
	1.1.8																				
	1.1.9																				
Output 1.2	1.2.1																				
	1.2.2																				
	1.2.3																				
	1.2.4																				
Outcome 2:																					
Output 2.1	2.1.1																				
	2.1.2																				
	2.1.3																				
	2.1.4																				
	2.1.5																				
	2.1.6																				
Output 2.2	2.2.1																				
	2.2.2																				
	2.2.3																				
	2.2.4																				
	2.2.5																				
	2.2.6																				

Output	Activity	Annual breakdown				Quarterly breakdown													
Outcome 3:																			
Output 3.1	3.1.1																		
	3.1.2																		
	3.1.3																		
	3.1.4																		
	3.1.5																		
	3.1.6																		
	3.1.7																		
	3.1.8																		
	3.1.9																		
	3.1.10																		
	3.1.11																		
	3.1.12																		
Output 3.2	3.2.1																		
	3.2.2																		
	3.2.3																		
	3.2.4																		
Outcome 4:																			
Output 4.1	4.1.1																		
	4.1.2																		
	4.1.3																		
	4.1.4																		
	4.1.5																		
Output 4.2	4.2.1																		
	4.2.2																		
	4.2.3																		
	4.2.4																		

Appendix 5: Key deliverables and benchmarks

See Appendix 3: Results Framework and Appendix 6: Costed M&E.

Appendix 6: Costed M&E plan

Type of M&E activity	Responsible Parties	Budget US\$ (Excluding project team staff time)	Time frame
Inception workshop and report	<ul style="list-style-type: none"> • NPC • NTAs (National Technical Advisor) • SA (Senior Advisor) • UNEP Task Manager (TM) 	Indicative cost: \$12,100	Within first two months of project start up
Measurement of means of verification of project results	<ul style="list-style-type: none"> • UNEP TM, • SA, • NTAs • NPC will oversee 	To be finalized in Inception Phase and Workshop. This includes hiring of specific studies and institutions, and delegate responsibilities to relevant team members.	Start, mid and end of project (during evaluation cycle) and annually when required.
Measurement of means of verification for project progress on output and implementation	<ul style="list-style-type: none"> • UNEP TM, • NPC, • SA, • NTAs and • project team 	To be determined as part of the AWP's preparation.	Annually prior to PIR and to the definition of annual work plans
PIR	<ul style="list-style-type: none"> • NPC • NTAs • UNEP TM • UNEP FMO (Fund Management Officer) • SA 	None. Financial audit records to be provided from IMIS for PSC review	Annually
Periodic status/ progress reports	<ul style="list-style-type: none"> • NPC • SA • NTAs • UNEP TM 	None	Quarterly
MTR/MTE	<ul style="list-style-type: none"> • UNEP TM/UNEP Evaluation Office 	Indicative cost: \$35,000	At the mid-point of project implementation.

Type of M&E activity	Responsible Parties	Budget US\$ (Excluding project team staff time)	Time frame
Terminal evaluation	<ul style="list-style-type: none"> • UNEP Evaluation Office 	Indicative cost: \$35,000	At least three months before the end of project implementation
Project terminal report	<ul style="list-style-type: none"> • NPC • NTAs • SA • UNEP FMO • UNEP TM 	None	On completion of the terminal evaluation.
Visits to demonstration sites	<ul style="list-style-type: none"> • UNEP TM • SA • NPC • NTA • NCCC/PSC representatives 	For GEF supported projects, paid from IA fees and operational budget	Yearly
Consultants	<ul style="list-style-type: none"> • International M&E Expert 	International M&E Expert: \$53,400	During baseline assessment in inception phase, at the mid-point of project implementation and at least three months before the end of project implementation
TOTAL indicative COST Excluding project team staff time and UNEP staff and travel expenses			Estimated to cost \$135,500

Appendix 7: Summary of reporting requirements and responsibilities

Reporting requirements	Due date	Responsibility
Inception Workshop Report	1 month after Project Inception Workshop.	<ul style="list-style-type: none"> • NPC • NTAs • UNEP Task Manager (TM) • CTA
Expenditure report accompanied by explanatory notes		<ul style="list-style-type: none"> • NPC • Finance and Administration Assistant
Cash Advance request and details of anticipated disbursements		<ul style="list-style-type: none"> • NPC • Finance and Administration Assistant
Supervision Plan	Before the end of the LDCF project's inception phase.	<ul style="list-style-type: none"> • UNEP
Progress reporting	Quarterly	<ul style="list-style-type: none"> • NPC • CTA • NTAs
Audited report for expenditures for year ending 31 December	Yearly on or before 30 June.	<ul style="list-style-type: none"> • Executing partners
Inventory of non-expendable equipment	Yearly on or before 31 January.	<ul style="list-style-type: none"> • NPC • Finance and Administration Officer
Co-financing report	Yearly on or before 31 July.	<ul style="list-style-type: none"> • NPC
PIR	Yearly	<ul style="list-style-type: none"> • NPC • NTAs • CTA • UNEP TM
Minutes of PSC meetings	Quarterly (or as relevant).	<ul style="list-style-type: none"> • NPC
Completion report	Within 6 months of project completion date.	<ul style="list-style-type: none"> • NPC • IA
Final inventory of non-expendable equipment		<ul style="list-style-type: none"> • NPC
Equipment transfer letter		<ul style="list-style-type: none"> • NPC
Final expenditure statement	Within 3 months of project completion date.	<ul style="list-style-type: none"> • NPC • UNEP
Mid-term evaluation	Midway through project lifetime.	<ul style="list-style-type: none"> • NPC • SA • UNEP TM • External Consultant
Final evaluation	At least 3 months prior to the project end date.	<ul style="list-style-type: none"> • NPC • NTAs • CTA • UNEP TM • External Consultant

Final audited report for expenditures of project	Within 6 months prior to project completion date.	<ul style="list-style-type: none"> • EA
Independent terminal evaluation report	Within 3 months prior to project completion date.	<ul style="list-style-type: none"> • NPC • NTAs • CTA • UNEP TM

Appendix 8: **Decision-making flowchart and organogram**

See Section 4: Institutional Framework and Implementation Arrangements and Figure 5.

Appendix 9: List of potential climate resilient trees that will be used in the project activities related to Acacia woodland restoration and agropastoral plot edge vegetation

Scientific name	Common name	Indigenous	Exotic	Invasive	Naturalised	NTFPs	Soil stabilisation	Drought tolerant	Soil fertility	Wind break	Flood tolerant	Salt tolerant	Fuelwood/Timber	Description of bio-physical parameters
<i>Atriplex canescens</i>	Fourwing saltbush		x			x	x	x		x	x	x		Fast growing deciduous or evergreen shrub, 0.3–2.5 m tall. Deep root system, up to 6 m deep. Annual rainfall: 200–360 mm. Altitude: 0–2,400 m. Long-lived. Most common in early succession areas, e.g. disturbed sites and sand dunes. Best suited to deep, well-drained, loamy to gravelly soils.
<i>Atriplex nummularia</i>	Old man saltbush		x				x	x	x	x		x	x	Slow growing shrub, 1.5–3 m tall. Carbon sequestration: C4 photosynthesis. Deep root system, 3–10 m deep. Annual rainfall: 200–650 mm. Moderate longevity, ~15 years. Grows well in coarse to medium textured soils. Tolerates very low temperatures.
<i>Haloxylon ammodendron</i>	Saxaul		x				x	x		x		x	x	Evergreen shrub or tree, 2–8 m tall. Altitude: 0–1,600 m. Prefers well-drained light (sandy) and medium (loamy) soils, and can grow in nutritionally poor soil, e.g. sandy deserts and sand dunes. Medicinal uses. Moderately deep root system (2.5 m, increasing with drought).
<i>Juniperus procera</i>	African juniper	x				x	x	x	x	x			x	Slow growing coniferous tree, 30–35 m tall. Annual rainfall: 300–1,200 mm. Root system probably deep. Medicinal uses (bark, leaves, twigs, cones). Decomposing leaves release acidic substances which are harmful to crops, so intercropping is not recommended. Useful as a shade tree because of spreading crown.

Scientific name	Common name	Indigenous	Exotic	Invasive	Naturalised	NTFPs	Soil stabilisation	Drought tolerant	Soil fertility	Wind break	Flood tolerant	Salt tolerant	Fuelwood/Timber	Description of bio-physical parameters
<i>Moringa oleifera</i>	Miracle tree / Drumstick tree / Horseradish tree			x	x	x	x	x	x	x		x	x	Extremely fast growing, drought tolerant tree, 5–10 m tall. Annual rainfall: 250–3,000 mm. Altitude: 0–600 m (can grow up to 1,000 m). Multiple uses, including animal fodder, water purification, natural medicines, fertiliser, living fences, alley cropping, natural pesticide, domestic cleaning agent and fuelwood. Nutritious and edible for humans. Umbrella shape provides good shade. Often deep rooted. Considered potentially moderately invasive in tropical regions, but has been grown in north Africa for a very long time. Attracts bees. Grows best in dry sandy soil, tolerates poor soil. Useful for intercropping.
<i>Faidherbia alba</i>	Balanzan tree / Harraz / Kad	x				x	x	x	x		x	x	x	Deciduous thorn tree, 6–30 m tall. Deep spreading root system. Annual rainfall: 250–600 mm. Medicinal uses; edible for humans and livestock. Useful for apiculture because it provides bee forage when other plants do not. Suitable for intercropping because it sheds leaves in the rainy season and so doesn't shade crops in the growing season. Leaves can be added to soil to enrich nitrogen concentration and increase crop yields. Grows on banks of rivers, in sandy soils and in vertisols.
<i>Parkinsonia aculeata</i>	Jerusalem thorn		x			x	x	x	x	x		x	x	Small spiny tree, 4–10 m tall. Altitude: 0–1,300 m. Mean annual temperature: 36 °C. Annual rainfall: 200–1,000 mm. Found on various soils, especially desert gravel and sands along valleys and canyons. Extensive root system. Attracts bees. Already present in Ethiopia.
<i>Parkinsonia scioana</i>	-	x						x						Shrub or small tree, 0.6–5 m tall.

Scientific name	Common name	Indigenous	Exotic	Invasive	Naturalised	NTFPs	Soil stabilisation	Drought tolerant	Soil fertility	Wind break	Flood tolerant	Salt tolerant	Fuelwood/Timber	Description of bio-physical parameters
<i>Prosopis juliflora</i>	Mesquite		x	x		x	x	x	x	x	x	x	x	Evergreen tree, 5–10 m tall (up to 20 m in favourable conditions). Annual rainfall: 50–1,200 mm. Deep root system, up to 20 m. Tolerates a wide range of soil and growing conditions. May however dry out soil and compete with grasses in dry areas, therefore considered a weed in some areas. Edible for humans and animals, medicinal uses. Provides excellent bee forage. Can be used for intercropping with <i>Opuntia</i> spp., <i>Cenchrus ciliaris</i> and <i>Panicum maximum</i> .
<i>Tamarix africana</i>	Salt cedar	x				x	x	x		x	x	x	x	Deciduous tree with a medium growth rate, up to 7.5 m tall. Tolerates up to 15,000 ppm soluble salt, which prevents foraging and parasitism. In saline habitats concentrates the excess salt in its leaves. Deep root system, up to 30 m deep, which spreads laterally up to 50 m at the level of the water table. Can be used as a hedge. Can tolerate maritime exposure. Suitable for most soils and conditions but cannot grow in shade.
<i>Tamarix aphylla</i>	Athel tree	x				x	x	x		x	x	x	x	Fast growing moderate-sized evergreen tree, 18 m tall. Altitude: 0–1200 m. Annual temperature: 10–50 °C. Annual rainfall: 250–500 mm. Thrives best on loam, though also found on stiff clays and sand. Grows more vigorously on land subject to occasional inundation than on land which is never flooded.
<i>Ziziphus mauritiana</i>	Jujube tree		x			x	x	x		x	x	x	x	Fast growing, medium lifespan, 3–4 m tall (up to 15 m in less severe conditions). Annual rainfall: 300–500 mm (lower limit: 120–200 mm). Extensive root system. Tolerates extreme temperatures. Altitude: 0–1,000 m.

Scientific name	Common name	Indigenous	Exotic	Invasive	Naturalised	NTFPs	Soil stabilisation	Drought tolerant	Soil fertility	Wind break	Flood tolerant	Salt tolerant	Fuelwood/Timber	Description of bio-physical parameters
<i>Acacia tortilis</i>	Umbrella thorn	x				x	x	x	x		x	x	x	Fast growing evergreen thorn tree, 5–20 m tall. Temperatures: 0–50 °C. Annual rainfall: 40–1,200 mm. Tolerates alkalinity and grows in sandy and stony soils and on steep slopes. Somewhat frost resistant after two years of growth. Deep and wide root system. Edible for humans and livestock, medicinal uses, but also used as a poison in some circumstances.
<i>Acacia asak</i>	Haq / Hashab	x				x	x						x	Shrub or slender thorn tree, 4–10 m tall. Altitude: 170–1,900 m. Grows in rocky places, in dry river beds and in deciduous woodland. Edible for livestock.
<i>Acacia ehrenbergiana</i>	Salam / Tamat	x				x		x					x	Tall shrub or small tree, up to 4 m tall. Annual rainfall: 50–400 mm. Grows in shallow depressions and gullies. Used for livestock feed. Has medicinal uses. Attracts bees.
<i>Acacia nilotica</i>	Babul / Egyptian thorn	x				x	x	x	x		x	x	x	Evergreen thorn tree, 2.5–25 m tall. Annual rainfall: 250–1,500 mm (can tolerate 100–2,300 mm). Temperature: 6–50 °C. Altitude: 0–2,000 m. There are many subspecies, which have a range of different soil and site preferences. Deep and extensive root system. Not frost tolerant. Can be used for live fences. Edible for humans and livestock. Medicinal uses. Attracts bees.
<i>Salvadora persica</i>	Mustard tree / Arak / Miswak	x				x	x	x		x	x	x	x	Evergreen shrub or small tree, 6–7 m tall. Annual rainfall: tolerates a wide range of conditions, from less than 200 mm to seasonally wet sites. Altitude: 0–1,800 m. Edible for humans and livestock. Medicinal uses. Attracts bees.

Scientific name	Common name	Indigenous	Exotic	Invasive	Naturalised	NTFPs	Soil stabilisation	Drought tolerant	Soil fertility	Wind break	Flood tolerant	Salt tolerant	Fuelwood/Timber	Description of bio-physical parameters
<i>Opuntia ficus-indica</i>	Indian fig / Prickly pear		x	x		x	x	x	x	x				Succulent shrub or tree, up to 5 m tall. Annual rainfall: 150–600 mm. Altitude: 0–2,600 m. Does not tolerate waterlogging or poorly drained soils. Grows easily on steep, rocky slopes, good for erosion control. Can be used to form hedges. Edible for humans and livestock. Medicinal uses. Invasive in South Africa.
<i>Cadaba rotundifolia</i>			x			x							x	Much branched shrub, up to 1-4 m tall. Altitude: 0-400 m. Found in irrigated plains or wadis. Used as an antelmintic or purgative. Cylindrical fruit.
<i>Tamarix nilotica</i>	Nile Tamarisk		x			x		x				x		Shrub or small tree, 2-5 m tall. Annual rainfall: 250-500 mm. Grows in saline sandy soils and desert habitats. Altitude: 0-1,000m. Used for medicinal purposes and as an aphrodisiac.
<i>Leucaena leucephala</i>	White leadtree / jumbay / white popinac		x	x			x		x				x	Small tree or shrub, up to 4 m tall. Grows on shallow, limestone soils (requires well-drained soils above pH 5). Annual rainfall: 650–1,500 mm (up to 3,000 mm). Does not tolerate waterlogging or poorly drained soil. Promoted as a “miracle tree” - used as firewood, livestock fodder and fibre. Young pods are edible for humans.
<i>Hyphaena thebaica</i>	Doum palm / gingerbread tree		x			x	x						x	Palm, 10-17 m tall. Annual rainfall: 100-600 mm. Altitude: 0-400 mm. Grows on silty soils on river and stream banks and on rocky hilly slopes, but tolerates a wide variety of soils. Also found near groundwater (oases and wadis). Easily recognisable by the dichotomy of its stems forming up to 16 crowns. It has been cultivated in Egypt since ancient times, its fruit is edible

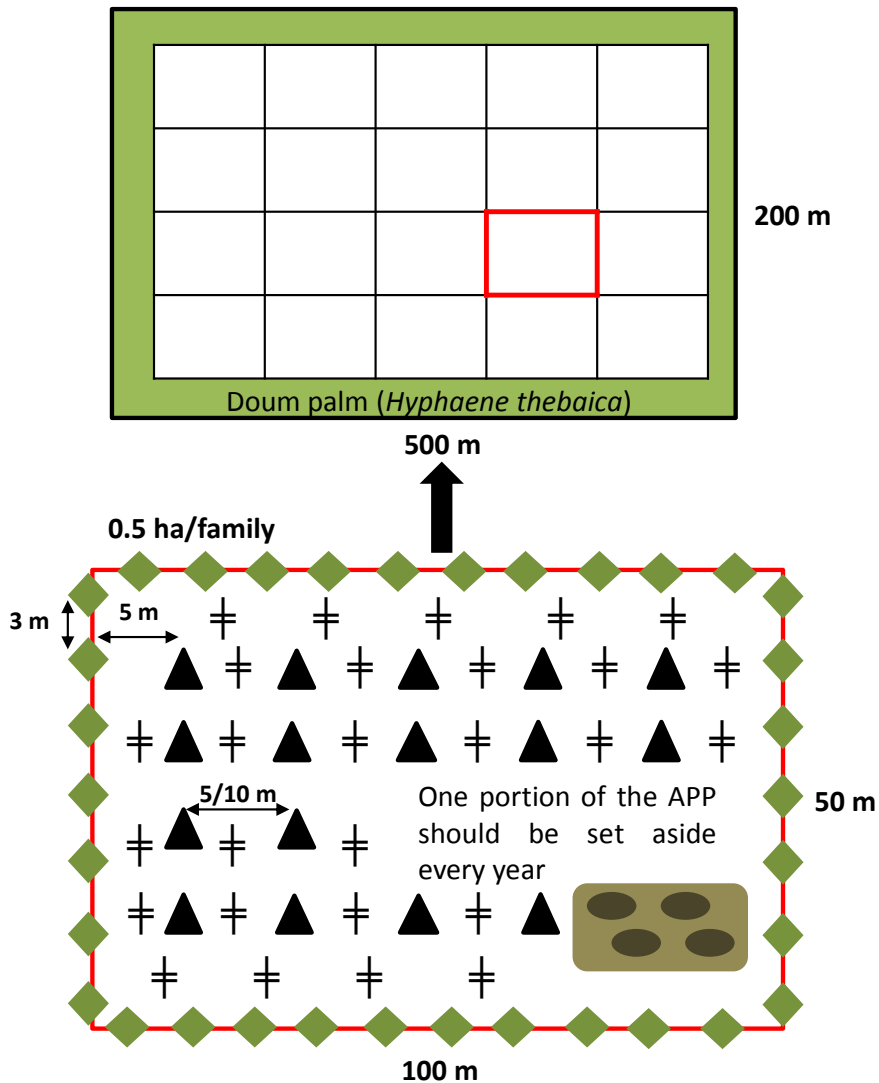
Scientific name	Common name	Indigenous	Exotic	Invasive	Naturalised	NTFPs	Soil stabilisation	Drought tolerant	Soil fertility	Wind break	Flood tolerant	Salt tolerant	Fuelwood/Timber	Description of bio-physical parameters
<i>Phoenix dactylifera</i>	Date palm tree		x			x						x		Palm with slender trunk, up to 30 m tall. Annual rainfall: 100–300 mm. Altitude: up to 1,500 m. Requires high temperatures and low air humidity. Tolerates a wide variety of soils, provided they are fertile and well drained. Cultivated extensively throughout southwestern Asia and northern Africa for its edible fruit (date).
<i>Azadiracta indica</i>	Neem / Nimtree / Indian liliac			x		x	x	x	x	x			x	Fast growing tree with a dense crown and white, fragrant flowers. 15–20 m tall. Annual rainfall: 400–800 mm. Altitude: up to 1,500 m. Grows in a wide variety of soils and climatic conditions. Its leaves are dried and used to repel insects and for religious purposes. The wood is valued for furniture. Neem oil is used for a variety of cosmetic purposes.
<i>Azadirachta indica</i>	Neem / Margosa tree		x			x		x					x	Fast growing tree, usually 15–20 m tall, up to 35–40 m. Evergreen, though may shed leaves in severe drought. Dense, round crown 15–20 m in diameter, valued as shade tree. Annual rainfall: 400–1200 mm or less if groundwater present. Temperatures: 4–50 °C. Altitude: 0–900 m.

Appendix 10: Agropastoral Plot

The following figure provides an illustration of the structure that will be adopted for the construction of the agropastoral plots (AAP), (see Output 3.1). This figure was developed with a National Consultant in agronomy. However, that structure and some of the species planted in the APP will probably differ between the two LDCF project areas and between the intervention sites within these areas. This is because the pedological properties are different between the intervention sites. A pedological study will therefore be conducted prior to the activities in Output 1.2. Additionally, the lessons learned in other APP will be used to identify a site specific set of species to be planted in each APP.

Notes:

- There are three agricultural plant types in the agropastoral plot (APP): i) fruit trees; ii) fodder (seeds and trees); and iii) crops.
- A composting site with four sections in the corner of each APP is recommended.
- Chilli and wild melon are insect repellants.
- Wild melon and neem can be saturated in water and the pulp used to repel insect pests.
- In Djibouti, dates are usually collected between January and April.
- Grasses (Poaceae) spp. are to be alternated with crops on an annual basis.
- Doum palms will be planted around the 10 ha agropastoral plots.



- ▲ 45 trees including guava (*Psidium* spp.), date palm (*Phoenix dactylifera*), mango (*Mangifera* spp.) and *Leucena leucociphola*.
- ◆ 60 trees including Nile tamarisk (*Tamarix nilotica*) and neem (*Azadirachta indica*).
- ⊕ fodder including *Panicum* spp., *Chloris* spp., *Crotalaria* spp., *Poaceae* spp. and *Macroptilium* spp. **OR** crops including white and red onions, carrots, beetroot, red peppers, chili, wild melon (summer); melon and watermelon (winter).
- ↕ 10 m between palm trees and 5 m between fruit trees.

Appendix 11: Summary mission 1

<p>United Nations Environment Programme</p>	<p>BACK TO OFFICE REPORT (BTOR) Djibouti</p> <p>Submitted by: Cara Tobin Date Submitted: 07/06/2013</p>
<p>1. Practice Area: UNEP 2. Service Line: Climate Change Adaptation</p>	
<p>3. Mission Period (incl. of travel days): 21-25 May 2013</p>	
<p>4. Type of Service/Mission</p> <p>Support for the Ministry on Habitat, Urbanism and the Environment (MHUE, Djibouti) and the UNEP Regional Office to formulate a project document for a LDCF financed initiative on Implementing adaptation technologies in fragile ecosystems of Djibouti's Central Plains</p>	<p>5. Client(s)</p> <p>Ministry on the Environment (MHUE) Djibouti, UNEP Regional Office</p>
<p>6. Purpose of Mission</p> <p>Project preparation (PPG) inception workshop for fragile ecosystems project in Djibouti including consultations with key national stakeholders and bilateral/multilateral representatives</p>	<p>7. Documents, Materials, Resources from Mission</p> <p>Conclusions from workshop including proposition of outputs / activities, risks and baseline projects, maps of regions, preliminary Stakeholder involvement plan, Press Release, photos of site visits</p>
<p>8. Mission Member(s) (include consultants if any)</p> <p>Cara TOBIN, Tel: +41786642272 (carachris11@gmail.com) Mohamed Ahmed DJIBRIL Tel : +25321351097 (schouneh@hotmail.com)</p>	<p>Figures</p> <ul style="list-style-type: none"> I. Mission Schedule and Findings II. Agenda for the PPG Inception Workshop III. List of Workshop participants IV. Meetings Minutes for the PPG Inception Workshop V. Indicative Activities List from the Workshop (Tadjourah) VI. Indicative Activities List from the Workshop (Hanle) VII. Proposed Flood Protection Measures (Tadjourah) VIII. Zones of Intervention of PROMES, PRODERMO and FAE projects IX. Map of Aquifer Depths, Djibouti X. Groundwater movement from Awash R. to Hanle plains

	XI. Proposition of Study Boreholes, Hanle XII. Stakeholder Involvement Plan XIII. Press Release, La Nation, Djibouti 27 May 2013 XIV. New technology to make use of Prosipice trees (FAO project)
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Brief Summary of the Mission:

The mission was undertaken to support the Ministry on Habitat, Urbanism and the Environment (MHUE) and the UNEP Regional Office to engage with Government and other key stakeholders in the design of a project on fragile ecosystems in Djibouti, to be financed by the LDCF. The primary tasks of this mission were 1) to detail the baseline of projects in the same two regions as the proposed project, Hanle and Tadjourah and 2) to develop project outputs and activities. Both tasks were addressed through i) extensive field visits to the regions where regional heads were consulted, ii) holding a workshop among the stakeholders including different government sectors and iii) conducting meetings with key representatives of bilateral/multilateral organizations represented in Djibouti. Potential co-financing sources including institutions managing/developing relevant on-going/planned related initiatives were also targeted to ensure the UNEP-GEF/LDCF project can leverage and mutually support (and be supported by) other projects.

- I. Bilateral consultations took place with technical institutions (the Research and Study Center of Djibouti, (CERD), Government departments (the Direction on Land Use and the Environment, DATE under MHUE; the Direction on Rural Hydraulics (DRH) within the Ministry of Agriculture, Livestock and Hydraulic Resources (MALHR); the PROMES and PRODERMO project coordination unit within the Programme on Surface Water Mobilization and Sustainable Land Management, MALHR; and the Direction of Overseas Financing. The purpose of these meetings was to inform the relevant institutions and departments of the scope of the proposed LDCF project, to understand the role of key actors, elicit ideas on details that could be factored into the LDCF project during the design phase so as to ensure that the LDCF financed project coordinates and complements other ongoing and planned initiatives. The costs for developing and facilitating adaptation measures in Hanle and Tadjourah will be provided to UNEP in subsequent information exchanges.
- II. Extensive field visits were conducted in Tadjourah and Hanle on the 22nd and 23rd of May respectively by a MHUE team including Mr. Dini Abdellah Omar, Secretary General of MHUE, Mr. Houssein Rirache Roblé, the National Project Director (MHUE), Mr. Mohamed Ahmed Djibril (MHUE) in addition to the International Consultant, Dr. Cara Tobin. The team met with the regional heads (i.e., Prefets) and informed them about the project's objectives and components. Based upon the framework of the LDCF project, the Prefets detailed the needs of the region. From the field visits a list of activities was detailed for each region. The activities can be seen in Figure V and VI. The Prefets also suggested how the activities should be prioritized based on urgent needs and long-term adaptation goals.
- III. An interactive national workshop was held on the 25th May 2013 at the Chamber of Commerce in Djibouti Ville, Djibouti. The workshop was used to bring together parties concerned with the Hanle and Tadjourah regions. The goal of the workshop was to gather Stakeholder input to contribute towards the design phase of the LDCF initiative. The workshop was also used to present the intended scope

of the project (as cleared by LDCF/Council) to the technical and financial partners and to exchange ideas on strategies to elaborate, implement and develop adaptation technologies in fragile ecosystems of Djibouti's Central Plains. Figure II shows the agenda for the workshop. The workshop involved 33 participants from organizations ranging from the Ministry on the Environment, the Ministry on Agriculture, the National Meteorological Agency, the Research and Study Center of Djibouti (CERD), the Fishing Directorate, the Economic Directorate and representatives from the Tadjourah prefect and the Tadjourah regional advisory committee. After an introduction by the Minister on the Environment, Mr. Mohamed Moussa Ibrahim Balala and a presentation on the scope of the project by the International Consultant, two working groups were formed. Both working groups refined the proposed activities and potential risks in both regions. (See Press Release Figure XIII.)

Key findings

1. Some of the key findings highlighted in the workshop and during Stakeholder consultations include (Note: Detailed ideas agreed upon by consensus are now reflected in the revised activities and outputs shown in Table 1):

- Need for sound, initial technical studies (e.g., hydrogeology)
- Lack of synergy and coordination amongst projects in the regions of Hanle and Tadjourah
- Need for monitoring and evaluation of projects
- Lack of automatic weather and hydrological monitoring equipment in both Hanle and Tadjourah, no Early Warning System exists
- Fishing industry market has a urgent need to be revitalized and has the potential to export nationally and internationally
- Need for the development of agropastoralism using lessons learned from various related initiatives in Djibouti (e.g., UNDP Adaptation Fund project, JICA project, EU projects) (See Table 2.)
- More knowledge sharing on water mobilization design with other project such as levee construction is required
- CERD requires a better collaboration with the Ministry on Water, particularly to coordinate flood modeling efforts (CERD will hire a hydrologist in 2013)

2. Recommended Outputs and Activities:

In accordance with conclusions from the workshop, this project will focus on implementing adaptation measures/technologies in the fragile ecosystems of Hanle and Tadjourah. The project will develop agropastoralism and fishing practices as well as eco-tourism and craftsmanship based on the needs of the principal end-users: the rural populations including farmers, livestock herders, fishermen and artisanal craftsmen in these regions. These regions have been chosen because they are considered fragile ecosystems in accordance with Djibouti's National Adaptation Programme of Action (NAPA) and due to their need for protection, rehabilitation and sustainable development.

Based on Stakeholder consultations, the following table shows the list of revised Outputs and Activities. The main differences from the Outputs/Activities proposed in the PIF include:

- Component 1, Protection against water-related CC hazards now has an output focusing on mobilizing surface water and groundwater to build the population's resilience to drought. This Output was previously placed under Component 3. Based on Stakeholder consensus, it was considered more logical to the Implementing Partner to lump all water-related activities in the same Output.
- In Component 3, an Output has been added stressing the need to revitalize the

fishing industry in Tadjourah using a sustainable approach including the procurement of solar-powered storage facilities and a public awareness campaign on sustainable fishing methods.

- More clarification and detail has been provided for Component 4 which focuses on capacity reinforcement. In particular, Output 4.1 focuses on capacity reinforcement at national levels for the Direction of Fishing on how to revitalize the fishing industry and for the Land Use Directorate on how to integrate vulnerability and risk assessments into land-use planning. Output 4.2 focuses on increasing adaptive planning on local levels in fishing, water management or agropastoral cooperatives/committees to have sustainable practices which enable them to adapt to climate change.

It should be noted that Output 4.1 requires the development of a more quantitative indicator to judge the integration of sustainable land-use practices into policies such as PRSPs or the Social Development Initiative of Djibouti, INDS (Dates for INDS revisions are needed).

Also, a key aspect of workshop and consultation discussions revolved around leveraging project funds so that coastal rehabilitation, agropastoralism and the fishing industry are sustainable in the long-term. Regular revenues from the sale of agropastoral fruits, vegetables, fish, meat and milk products to the private sector could help the project to develop cost-recovery mechanisms such as to cover the costs of operation and maintenance for wells. This must be further developed during project design.

Table 1: Proposed Outputs and Activities

Project Component	Expected Outputs	Activities
1. Protection against water-related CC hazards	1.1. Protective measures against floods and sedimentation in cities and settlements using innovative levee and microdam construction	1.1.1 Engineering design study on microdams and levees in Hanle and Tadjourah including the channeling of wadi flood flows in Tadjourah (Marsaki and Magali) 1.1.2 Rehabilitation of 2 levees and construction of 2 levees, all reinforced with metal grating, in Marsaki, Tadjourah 1.1.3 Construction of 4 levees, all reinforced with metal grating, in the wadis of Deralwa and Kouli-Koma 1.1.4 Construction of micro-barrages and water retention basins upstream of levees 1.1.5 Support and promote 'Food for Work' to employ locals with levee and microdam construction
	1.2 Resilience building measures against droughts with water and groundwater resource mobilization	1.2.1 Technical watershed studies on surface water and groundwater resources (including capacity and water quality) in the Hanle and Tadjourah regions 1.2.2 Construction of 6 boreholes including solar-powered pump systems and covered water reservoirs in Tadjourah: Marsaki (1), Abbouya (1), Kalaf (1), Walwalé (1), Onpekanuf, (1) and Affanoina (1) 1.2.3 Rehabilitation of 2 boreholes in Hanle including covering existing water

		reservoirs, repairing the solar-powered pump system in Kouli-Koma (1) and installation of a solar powered pumping system in Deralwa (1) 1.2.4 Construction of 2 reservoirs in Tadjourah
	1.3 Early Warning System developed for flood forecasts and climate predictions on water resources in Hanle and Tadjourah	1.3.1 Procurement of 1 synoptic Automatic Weather Station (AWS) in Hanle and 1 synoptic Automatic Weather Station (AWS) in Tadjourah 1.3.2 Procurement of cell phone towers to assist with real-time data transmission to the Early Warning System analysis system at CERD 1.3.3 Development of a flood forecasting model and climate predictions in Hanle and Tadjourah by CERD
2. Ecosystem rehabilitation, recovery and resilience	2.1. Restored vegetative cover and soil stabilized in an estimated XX ha in Hanlé central plains ecosystems	2.1.1 Reforestation and revegetation in Hanle region with native acacia trees and other adapted, resilient and productive species for anti-erosion control and flood protection (approximately XX ha) 2.1.2 Preservation of local vegetation species in Hanle and Tadjourah by creating protected areas (XX ha, locations to be determined) 2.1.3 Pilot project in Hanle and Tadjourah on making sustainable uses of the non-native invasive prospice species, including testing a new technology from Kenya which enables the production of honey from prospice flowers and animal feed from ground-up prospice seeds
	2.2 An estimated XX ha of restored mangroves in the central coastal zone of Tadjourah	2.2.1 Planting of XX ha of mangroves in Kalaf to protect against erosion and sea level rise 2.2.2
	2.3 Restored reefs along White Sands Beach (au Sables Blancs, approximately 1 km ²) in the Tadjourah coastal zone	2.3.1 Technical study on the current state of coral reefs at White Sands Beach and proposition of reef protection measures 2.3.2 Rehabilitation and sustainable management of coral reefs at White Sands beach in partnership with the private sector
3. Sustainable and resilient livelihoods	3.1 Productive oasian ecosystems that build the resilience of agropastoralists in 6 areas (2 Hanle and 4 in Tadjourah), benefiting 200 families (1 ha each)	3.1.1 Enlargement and preparation of 2 agropastoral plots in Kouli-Koma (1, 32 ha) and Deralwa (1, 40 ha) including construction of stone, cemented perimeter walls to protect against sedimentation and planting of wind-blocking vegetation 3.1.2 Construction and preparation 4 agropastoral plots in Tadjourah (locations to be determined), 32 ha each, including construction of stone, cemented perimeter

		walls to protect against sedimentation and planting of wind-blocking vegetation 3.1.3 Development of 'smart-water' micro-irrigation systems for agropastoral plots, including the use of PVC piping to transport water and limit evapotranspiration 3.1.4 Cultivation of drought and salt tolerant plant seedlings to be planted in the agropastoral plots
	3.2 Fishing industry revitalized in Tadjourah using a sustainable approach	3.2.1 Procurement of solar-powered freezers to store fish stocks 3.2.2 Construction of sanitation facilities and building annex for fish storage 3.2.3 Procurement of solar-powered boats to enable more efficient fish cultivation 3.2.4 Public awareness campaign on sustainable fishing methods
	3.3 Increased, diversified and resilient livelihoods from the introduction of sustainable alternative economic development activities	3.3.1 Introduction of alternative livelihoods including apiculture, aquaculture and artisanal craft opportunities in Tadjourah using the regional and NGO/CSO support, particularly the women craft NGO in Tadjouah 3.3.2 Development of eco-tourism industry in Tadjourah, particularly the White Sands Beach area 3.3.3 Creation and reinforcement of fishing cooperatives to use microfinance for local market opportunities 3.3.4 Reinforcement of microfinance knowledge in Hanle and Tadjourah to support agropastoral/pastoral production including preparation of various milk products and understanding of local market opportunities
4. Institutional capacity	4.1 Increased enforcement and monitoring capacity for national institutions	4.1.1 Regional knowledge sharing for the Direction of Fishing and local focal points from Tadjourah on how to revitalize the fishing industry in Djibouti and tap into new markets 4.1.2 Reinforcement for ministries on how to coordinate funds appropriated to climate change activities in a transparent manner and how to create synergies between projects via knowledge and resource sharing 4.1.3 Capacity reinforcement for the Land Use Directorate on the integration of vulnerability and risk assessments (e.g. UNEP's PROVIA analysis) into land use planning and the development sustainable up-scaling strategies (INDICATOR TO BE DEVELOPED, e.g., Updates to PRSPs or

		INDS Social Development Initiative)
	4.2 Increased adaptive planning capacity at local levels using an ecosystem-based approach	<p>4.2.1 Development of viable and sustainable market plan for new local fishing industry in Tadjourah including capacity reinforcement on how to maintain equipment and materials long-term</p> <p>4.2.2 Reinforcement in Hanle and creation / reinforcement in Tadjourah of water management committees to support good water practice guidelines</p> <p>4.2.3 Reinforcement of agropastoral cooperatives and existing family management systems in Hanle and Tadjourah on date-palm tree planting, cultivation of drought and salt tolerant plants and micro-irrigation techniques</p> <p>4.2.4 Rural community capacity to adapt to climate shocks is strengthened by supporting MHUE and NGOs/CSOs to promote understanding of climate change</p>

3. Prioritization of activities

Activities were prioritized at the regional levels on-site and during the workshop. Consensus showed that investment must be foremost made in water mobilization. Project activities will focus on securing access to water as a prerequisite for the sustainable development of viable agropastoral systems. The targeted areas will be used to develop a sustainable model of groundwater efficient extraction. With sufficient water resources and capacity reinforcement on water conservation, borehole/pump operation and maintenance and productive agricultural practices, the beneficiaries will be able to feed their families/livestock and have the opportunity to generate income. Income can then be invested using microfinance to facilitate the diversification of livelihoods.

Matched as the highest priority is the need to increase the resilience of the populations to the effects of floods. The construction of levees and microdams is essential in Hanle and Tadjourah to prevent the detrimental impacts of erosion and sedimentation. With 6 wadis in Tadjourah, significant flood protection measures must be implemented.

A second tier priority is revitalizing the fishing industry which has the potential to provide sustainable sources of income to Tadjourah if capacity reinforcement is appropriate and sustainable fishing methods are promoted. It is recommended to send some lead fishermen to successful fisheries in the region for training. Subsequently, an international fishing expert can be recruited to provide guidance to local fishermen in Tadjourah.

Thirdly, Stakeholders indicated that they need to plant mangroves in Tadjourah and support reforestation in Hanle. A sensitive topic is the invasive non-native prosopice species. It is considered a menace by the Ministry on the Environment, yet is seen to have potential uses by the Ministry on Agriculture. The project will take a neutral approach in not promoting further proliferation of prosopice while funding a pilot project to explore any potential uses of the plant and tree prosopice species. During the site visit in Hanle, the Director of the Ministry of Agriculture was present. In his presence, agricultural experts demonstrated a new technology imported from Kenya to make use of prosopice trees (See photo of equipment in Figure XIV). Support for this technology is provided by

a FAO project. A pilot project in Activity 2.1.2 is planned to test the technology in the LDCF project.

4. Technical Studies Required

Groundwater studies already exist for both Tadjourah and Hanle. In Tadjourah, (Marsaki), the Department of Rural Hydraulics (DRH) has conducted extensive groundwater studies. Reports of these studies will be provided to UNEP. In spite of these studies, DRH does not fully know the potential of groundwater resources in Hanle. It is generally agreed that the watershed is replenished well by the Awash River originating in Ethiopia and should be sufficient (See Figure IX and X for groundwater and aquifer maps). However, the exact quantity and quality of the water is unknown and remains to be studied in technical studies.

A Master's thesis on modeling the volcanic aquifer and studying the region's hydrogeology in the Hanlé area was conducted in 2002 and supported by CERD. The study is part of *Djibouti's Master Plan to Secure Water Resources*. In this work, several mathematical models using different hydrogeological conditions were studied including different hydrodynamic characteristics, reservoir structures, hydro-geochemical results and hydraulic relationships with the sedimentary aquifer systems. Results indicated that continued modeling with additional data is required. The installation of 9 boreholes as seen in Figure XI is recommended to collect new data.

5. Water Mobilization

There are 6 functional boreholes, several community water management groups and 85 people involved in an agricultural cooperative in Hanle. Most of the agricultural plots in Hanle are run by private cooperatives. The private cooperatives have worked with the Ministry of Agriculture and CERD to develop more drought and salt tolerant plants.

For the public plots, populations in Hanle need reinforcement for the existing solar powered borehole system in Kouli-Koma which is not functioning well because it was not properly designed (capacity was under-sized) and the community was not trained in operation and maintenance. In Deralwa, a diesel pump which powers a borehole is not functioning. It needs to be replaced with a solar-powered pump system with appropriate design for sufficient capacity.

Several studies demonstrated that water mobilization is of utmost importance for Djibouti and will build the resilience of the country to climate change either for rural or for urban areas. These assessments include notably:

- The report "Master Plan for Agriculture" which stresses the need to develop water mobilization projects;
- The evaluation report of the African development Bank for the project "Mobilization des eaux à usage domestique et agricole" reported the need for water mobilization for the development of agricultural activities in Djibouti;
- Scientific studies on the Djibouti aquifers by CERD which have stressed the unbalance between the current natural recharge and the pumping demand and the need for more water capture and storage for uses such as agriculture.

6. Agropastoralism

The development of agropastoralism will also be supported by this project in both Hanle and Tadjourah where families are already installed. In Hanle, the project will build off the existing small agricultural plots and boreholes around which communities have settled.

Agropastoral projects in the past (see Table 2) have shown that well managed date palms and oasis-type agropastoral systems demonstrate excellent robustness to drought and relatively good tolerance to salinity. Particular forage species such as Moringa Oleifera and Tamarix Africana can serve as multi-purpose plants by providing shade, wind protection and attracting bees for pollination. Similarly, date palm trees are multi-purpose by producing dates for food and trade, date stones for feed, palms for feed and handicraft, and activities which together can help spread the risks from drought hazards. Agropastoralism with such vegetation is not a new practice in Djibouti, particularly in Hanle where private cooperatives and CERD have already shown success. Also, according to the regional head of Tadjourah, 60% of the land could be fertile if water is mobilized appropriately. Adoption of drought tolerant species and varieties as well as composting and mulching practices will be necessary to both reduce the demand for water and increase the natural water storage potential of the soil.

7. Existing EWS (waiting on additional information from CERD)

An existing EWS for droughts exists at the Research and Study Center of Djibouti (CERD). CERD and within the Ministry of Agriculture, Livestock and Hydraulic Resources, MALHR. Both agencies exploit data from the FEWSNET initiative. Some regions have a flood EWS in place, however, flood EWS is non-existent in both Hanle and Tadjourah. In order to have EWS in these regions, a few Automatic Weather Stations (AWS) must be placed in the regions (quantity to be detailed) and antennae must be installed to facilitate data transmission. Synoptic stations are recommended so that soil moisture measurements can be recorded. CERD already has experience managing AWS in other regions. According to the Ministry of Agriculture, Livestock and Hydraulic Resource, more rain gauges and groundwater piezometers are required. CERD has significant hydrogeological modeling experience with variations of the MODFLOW software. According to a 2000 report on the optimal hydrological network in Djibouti from CERD...

The Department of Rural Hydraulics, DRH is also involved with EWS. They are a member of the WHYCOS, Hydromet and Meteosat projects. Through WHYCOS, they will receive a new hydrological model in October. Meteosat gives them real-time satellite data.

In terms of EWS communication, a formalized mechanism for transmitting alerts within ministries exists, however outreach communication to local populations is limited. For example, a destructive flood occurred in April 2013 where 8 military personnel died because they could not be forewarned.

8. Key Stakeholders

Key stakeholders include the following. A table in Figure XII shows their potential role in the LDCF project.

- The Research and Study Center of Djibouti, CERD
- The Direction on Land Use and the Environment, DATE under MHUE
- The Direction on Rural Hydraulics (DRH) within the Ministry of Agriculture, Livestock and Hydraulic Resources MALHR)
- The PROMES and PRODERMO project coordination unit within the Programme on Surface Water Mobilization and Sustainable Land Management within (MALHR)
- The Direction of Overseas Financing Leveraging eco-tourism and the private sector
- The Ministry on Agriculture
- The National Meteorological Agency

- The Fishing Directorate
- The Economic Directorate
- Regional government of Tadjourah including the regional head (Prefet) and the regional advisory committee
- Regional government of Hanle including the regional head (Prefet) and the regional advisory committee
- Women NGO/CSO in Tadjourah promoting crafts (Association des Femmes de Tadjourah, Artisanat)

9. Risks

All proposed risks were agreed to be relevant and correctly categorized during the Workshop. Additional proposed risks and their levels include the following:

- Initial studies reveal insufficient water availability and quality (Low)
- Low level of cooperation between executing institutions (Medium)
- Delays in project implementation due to simultaneous construction works for complementary projects (Low)
- Theft of solar panels, pump parts or fencing materials (Low)
- Implicating too many Stakeholders in project execution which can be mitigated by having a Stakeholder consultation framework and clearly defining the role of the Project Steering Board (Medium)

10. Socio-economic benefits

Socio-economic benefits from the agropastoral part of the project will come from multipurpose trees and plants which can be used to reinforce fencing and block winds. Women and children will be less burdened with fetching water due to the close proximity of the new water points. The resulting gain in time will empower women and give them more time to establish sustainable livelihoods.

As indicated in Stakeholder consultations with agropastoralists in Hanle, in terms of economic benefits, the development of 1 ha agropastoral shade gardens can produce sufficient revenues per family after the first 3 months with the cultivation of melons, onions, gumbo, peppers and other fast-growing fruit and vegetables year-round. For instance, significant profits can be made by selling onions during the winter and melons during the summer. With the production of 2 tons/year of onions and 4 tons/year of melon per shade garden, profits can total approximately 5,300 USD/year. Pastoralists have the potential to earn up to 3,500 USD/year in milk sales. Subsequently, after a few years of date tree cultivation, as much as 1.3 tons/year of dates can be produced per shade garden. Dates sales in the local market have the potential to generate revenues approaching USD 3,500/year¹⁰⁹. Furthermore, the demand for quality dates is high in

¹⁰⁹ It is estimated that a well-managed shade garden can produce an average of 50 kg of dates per date tree, 2,000 kg of onions and 4,000 kg of melon per year. The project plans 228 shade gardens with 25 date palm trees each. Date production per shade garden is 50 kg * 25 trees = 1.3 tons/yr. The average price of dates in Djibouti is estimated at a minimum of 500 DJF/kg, which results in an annual income reaching 3,500 USD per shade garden per year. Onions and melons are sold in the Djibouti market for 70 DJF/kg and 0.5 DJF/kg respectively. Watermelon can also be sold for 6,000 DJF/sack (each sack is 30 kg). Assuming, 10 sacks can be sold per month, a farmer can earn 60,000 DJF/month.

Djibouti (the few tests conducted so far have shown a great selling success¹¹⁰), yet have only been able to be satisfied by imports thus far.

Also, this project can provide improved water points and less degraded pastures and/or high quality agricultural products on the local markets, leading overall to improved animal health and productivity, greater sources of income and better food security and diet conditions. Furthermore, Component 3 includes capacity reinforcement for pastoralists, agropastoralists, local crafts groups and fishermen to use microfinance and become financially literate in order to facilitate the diversification of their livelihoods by recognizing and taking advantage of market opportunities.

11. Focus on gender

Women in general, are more vulnerable to the effects of climate change relative to men; they constitute the majority of the world's poor (two-thirds, O'Brien 2008) and are more dependent for their livelihood on natural resources that are threatened by climate change, particularly those living in rural regions who have limited mobility. The gendered division of household labour means that women are responsible for the majority of subsistence household chores; women are generally charged with the responsibility to secure water, food and fuel for cooking and heating and often have very little time to devote to alternative sources of income due to domestic and farming responsibilities; in addition, they may be excluded from some activities due to cultural norms, or due to lack of capital and ownership arrangements that confer all rights to men in the family. Due to all of these reasons, it is thus important to identify gender-sensitive strategies to ensure women are included in measures designed to improve their resilience and capacity to adapt to climate change (UN Women Watch 2008).

The project will include women by working together with the women craft NGO in Tadjourah (At least 5 other NGOs/CSOs exist in Tadjourah and number is unknown in Hanle, so more information is needed). This NGO is quite active and can help to outline sustainable ways to diversify livelihoods. Similarly, the participation of women is high in the established water management committees in Hanle. The water management committees at existing agropastoral plots will be further consulted during the project preparation phase.

In order to fully ensure the participation of women in project design, gender disaggregated indicators will be developed and used to gauge project progress. It is suggested to use the following:

- Number of women trained in good water management practices
- Number of women who receive flood alerts provided by the EWS developed by the LDCF project in Hanle and Tadjourah

12. Advancing LDCF in terms of alignment with existing baseline projects

A good synergy must be developed with other donor funded projects. Details on the projects are provided below:

The PRODERMO project is taking place in both the Tadjourah and Hanle regions (see map Figure IX). The PROMES project is taking place in Tadjourah. PRODERMO began

110 Since 2005, CERD has developed first shade gardens nearby the research station in collaboration with local farmers. The first harvests have been successfully sold in the streets of Djibouti within a few hours which shows that the local demand for such commodity is high. Consumption of dates, through import from the Arabic Peninsula, is also widespread in Djibouti.

in 2012 to combat drought, provide access to water and conserve soils by fencing sensitive ecosystems. Through this project, artisanal cooperatives were created. Report on PROMES needed...

(a) The lessons learned by PRODERMO/PROMES technical teams housed at the Ministry of Agriculture, Livestock and Hydraulic Resources MALHR, in the design, construction and maintenance of water mobilization can be utilized by the LDCF project. Sharing of knowledge between the project teams can be fostered, particularly in regard to national norms and standards relating to the design, construction and maintenance of water mobilization infrastructure in the climatic and geomorphic context of Djibouti.

The community-based approach used by PRODERMO in order to mobilize the communities in Day Forest for reforestation activities will also be adopted in the LDCF project. Knowledge-sharing will be fostered between project communities, especially in tree nursery management and forest preservation.

(b) Furthermore, the PRODERMO project concerns the coast and land management. Official documents on the PRODERMO project will be shared with the project developers so that they can quantify non climate change related activities which can be used to co-finance this project.

BAD – FAE: The African Development Bank (AfB) also has a project in Tadjourah on Enabling Access to Water (FAE). In this project, AfB studied 10 watersheds and outlined and prioritized the surface water needs in each. Needs are based on a survey of 24,000 people across the country. Through the FAE project, 6 regional pilot committees have been created and a dam expert from Mali has been hired to help with designs. For Tadjourah, the region requires reforestation, cisterns and shallow wells as well as micro-dams and levees to control flooding. Official documents on the FEA project will be shared with the ICs to quantify non climate change related activities which can be used to co-finance this project.

(c) IGAD – Programme de pays pour mettre fin aux urgencies liees aux secheresses dans la corne de l'Afrique: Programme-LDCF synergies must be considered relative to the creation of water points, market support (e.g. the creation of pastoral milk associations) and the creation of micro-finance instruments for rural areas.

(d) The AfDB 'Rural Livelihoods Adaptation to Climate Change in the Horn of Africa' project is currently at PFD stage and, being a regional project, is necessarily lacking in detail with regard to its Djibouti-based activities. Nonetheless, it is clear that geographical overlaps between the UNEP-LDCF and the AfDB-LDCF projects will be limited. The AfDB project will target an upper part of the Weima watershed near Tadjourah: There is also a difference in philosophy between the two projects. The AfDB project seems to focus more on how to improve the lives of pastoralists.

Other projects, particularly relevant to the development of agropastoralism are detailed in Table 2 below:

Table 2: Related Agropastoral initiatives

Project name	Source	Estimated budget	Synergy with Project	Status
World Alliance Combatting Climate Change	EU	3 million EUR	This alliance focuses on supporting water, wastewater and energy projects in Djibouti. The current project will build a	Project began in 2012 and has a

(L'alliance Modiale contre le Changement Climatique, AMCC)			25 ha agricultural plot to be irrigated with treated wastewater. Knowledge sharing on drought and salt tolerant agricultural practices, micro-irrigation, forming cooperatives and choosing beneficiaries will be incorporated into this project	duration of 42 months
Supporting Horn of Africa's Resilience (SHARE), Project to Secure Pastoral Systems in Djibouti	EU	6.6 million EUR	Through the project, a strategy to have sustainable pastoralism and livestock grazing in arid and semi-arid environments is being launched. Lessons learned from this project on how to market milk products will be incorporated into the AF project.	2013 - 2017
The Master Plan Study for Sustainable Irrigation and Farming in Southern Djibouti, JICA project	JICA	2,335,675 USD	This project involves finding water resources and establishing agropastoral plots in the south of Djibouti. As this project has already begun, the AF project will take the lessons learned from it, including how to build dams, how to train the agropastoralists, and how to best market agropastoral products.	2012 - 2014
Developing agropastoral shade gardens as an adaptation strategy for poor rural communities	UNDP Adaptation Fund	4,658,556 USD	This project will develop 6 sets of agropastoral plots in Arta and Ali Sabieh. Also, microfinance products geared towards adaption to climate change activities will be developed and promoted.	2013 - 2017

13. Co-financing:

A bilateral consultation with the Director of External Investments was conducted on the 21 May 2013. Confirmed co-financing partners include the Port at Tadjourah and the INDS or PIP Social Development Initiative in Djibouti as outlined in the PIF. However, the amounts of co-financing will be adapted. There is also potential for co-financing with FADES, the Islamic Development Bank and the STAR project. The STAR project is a flexible fund on droughts and renewable energy (more info on the STAR project is required).

The Director recommended that project funds are used to reinforce the capacity of existing ministries on 1) how to coordinate funds in a transparent manner, 2) how to manage tender process with donors / partners and 3) technical training. There is also a need to create a synergy platform among ministries using external financing because it is difficult to re-unite representatives. He recommended using more south-south co-

operations and regional knowledge sharing. Such recommendations have been incorporated into Outputs 3.3, 4.1 and 4.2 (See Table 1). In the case of the UNEP LDCF project, regional knowledge sharing can be promoted for the development of eco-tourism, the fishing industry, microfinance and agropastoralism.

14. Project work plan

This project will initiate parallel discussions with the technical departments (CERD, the Ministry of Agriculture, the National Meteorological Service, MHUE) and the donor agencies (African Development Bank (BAD), EU, JICA) to identify specific areas of support required (thematically, geographically and financially). Further dialogues to ensure prioritization of needs amongst stakeholders and end-users in Hanle and Tadjourah will take place over the next month by MHUE, a team of international consultants at C4Ecosolutions with the assistance of the UNEP Regional Office. These meetings will involve prioritizing budget distributions for the activities. It is also planned that meetings will be planned with private sector representatives such as the Tadjourah Port to gauge their interest in developing eco-tourism.

15. Implementation arrangement

At this stage of the project, the implementation arrangement has not been finalized. Workshop conclusions and consultations with the Stakeholders demonstrated a general consensus that the project should be implemented by the Ministry on Habitat, Urbanism and the Environment. It was also concluded that a Project Steering Committee should include only the essential, relevant agencies to facilitate decision-making. Further discussion will be initiated to analyze the means to solve the existing lack of project coordination.

Follow-up Action Matrix

Actions to be taken	By Whom	Expected Completion Date
Collection and synthesize of baseline projects	Cara Tobin (IC)	End June 2013
Follow-up workshop with Stakeholders to detail the chosen activities and to obtain estimated costs	Mohamed Ahmed Djibril	Mid July 2013
Follow-up meeting/stakeholder consultation and beginning of collection of cofinance letters		August 2013
Finalization of institutional arrangement		End August 2013
First draft PPG report		September 2013
Final collection of cofinance letters	UNDP CO, IC and NCs	End September 2013
Submission of the final project document to GEF	UNDP	October 2013
Project completion	UNDP CO, IC and NCs	November 2013

13. Distribution List (BTOR sent to):

UNEP Regional Office (Nina Raasakka), MHUE (Mr. Dini Abdellah Omar, Secretary General of MHUE, Mr. Houssein Rirache Roblé, the National Project Director (MHUE), Mr. Idriss Ismael Nour (MHUE), Mohamed Ahmed Djibril (MHUE), C4EcoSolutions

Figure 1 – Mission Schedule

Agenda: Inception Workshop and Bilateral/Multilateral Meetings for the preparation of the UNEP LDCF project in Djibouti (21 to 25 May 2013)

Day/Date	Time	Meetings/Activities	Remarks
Tues 21 Sep 2013	9:30 – 10:00	Internal meeting between Mohamed Ahmed Djibril, Ministry on Habitat, Environment and Urbanism (MHUE), Direction on Land Use and the Environment (DATE), Mr. Dini Abdellah Omar, Secretary General of MHUE, Mr. Houssein Rirache Roblé, the National Project Director (MHUE), and International Consultant, Cara Tobin	<ul style="list-style-type: none"> • Finalization of Inception workshop agenda, key Stakeholders to be invited • Organization of meetings, field visits and inception workshop • Discussion on field visits and meetings with Prefects (Regional Heads)
	10:00 – 10:30	Meeting with the Director in Charge of the Direction on Rural Hydraulics (DRH) within the Ministry of Agriculture, Livestock and Hydraulic Resources (MALHR), Madame Souad Souleiman Ahmed	<ul style="list-style-type: none"> • Hanle has strong agricultural cooperatives but need reinforcements for solar powered borehole systems • Groundwater studies already exist for both Tadjourah and Hanle • In Tadjourah, (Marsaki), have conducted extensive GW studies which DRH will provide UNEP • DRH does not fully know the potential of groundwater resources in Hanle but there is most likely not a problem because the watershed is replenished in Ethiopia (must speak with CERD) • There are numerous boreholes, community water management groups and agricultural (including agropastoral) plots in Hanle • DRH is part of WHYCOS project, Hydromet and Meteosat. Through WHYCOS, they will receive a new hydrological model in October. Meteosat gives them real-time data • Another department within the MALHR uses FEWSNET to predict droughts

			<ul style="list-style-type: none"> • Capacity reinforcement needed: More rain gauges and groundwater piezometers
	10:30-11:30	Meeting with the Principal Coordinator of the PROMES and PRODERMO projects within the Programme on Surface Water Mobilization and Sustainable Land Management within (MALHR), Mr Said Mohamed Baragoita and Northern project coordinator for the PRODERMO project, Mr. Hojan	<ul style="list-style-type: none"> • Provided us a map indicating locations of PROMES and PRODERMO projects. • Tadjourah region has both projects and Hanle has the PRODERMO project • The PRODERMO project concerns the coast and land management. Official project documents will be shared with the IC to quantify non climate change related activities which can be used to co-finance this project • The African Development Bank also has a project in Tadjourah on facilitation the access to water (FAE). In this project, they studied 10 watersheds and outlined and prioritized the surface water needs in each. Needs are based on a survey of 24,000 people across the country. For Tadjourah, the region requires micro-dams and levees to control flooding, reforestation, cisterns and shallow wells • Through the FAE project, 6 regional pilot committees have been created and a dam expert from Mali has been hired to help with designs • Capacity reinforcement required: More knowledge sharing on technical water mobilization design such as levee design • PRODERMO began in 2012 to combat drought, provide access to water and conserve soils by fencing sensitive ecosystems. Through this project, artisanal cooperatives were created.
	11:30 – 12:30	Meeting with Mr. Almis Mohamed Abdillahi, Director of Overseas Financing	Discussed potential for co-financing by

			<p>FADES and Islamic Development Bank</p> <ul style="list-style-type: none"> • Discussion on short-term, medium-term and long-term needs for projects concerned with adaptation to CC • UNEP project will focus on long-term and collaborate with WB, AfB and FIDA • Issue with immigration from bordering countries which compounds efforts to combat CC such as need to support refugee camps in Hanle • Capacity reinforcement needs: 1) train ministries on how to coordinate funds in a transparent manner, 2) how to manage tender process with donors / partners and 3) technical training • Need to create synergy platform among ministries with financing because it is difficult to re-unite representatives • Use more south-south co-operations and regional knowledge sharing • Fishing industry market has strong needs to expert nationally and internationally and be revitalized • STAR project is a flexible fund on droughts and renewable energies, need to create synergy
	12:30-13:45	Meeting with the Director of the Center of Research for Djibouti (CERD), M. Jalladin Mohamed and the Director of the Life Sciences Institute of CERD, M. Abdourahman Daher	<ul style="list-style-type: none"> • CERD has existing EWS in the Hambli watershed • They have existing EWS for droughts • Need antennae and AWS equipment in both Hanle and Tadjourah
Wed 22 May 2013	8:00-15:00	Meeting with Regional Head (Prefet) Tadjourah	<ul style="list-style-type: none"> • Presentation of project • Proposition of activities by Regional Head (Prefet) of Tadjourah (See Figure XX)

			<ul style="list-style-type: none"> • Field visit with Prefet and other regional government officials (See photos Figure XX)
Thurs 23 May 2013	8:00-15:15	Meeting with Regional Head (Prefet) Hanle	<ul style="list-style-type: none"> • Presentation of project • Proposition of activities by Regional Head (Prefet) of Tadjourah (See Figure XX) • Field visit with Prefet and other regional government officials (See photos Figure XX)
Fri 24 May 2013	16:00 – 20:00	Meeting to organize workshop with Mr. Mohamed Ahmed Djibril (MHUE), Mr. Dini Abdellah Omar, Secretary General of MHUE and Dr. Cara Tobin, International Consultant	<ul style="list-style-type: none"> • Presentation of project • Proposition of activities by Regional Head (Prefet) of Hanlé (See Figure XX) • Field visit with Prefet and other regional government officials (See photos Figure XX)
Sat 25 May 2013	8:00-14:00	PPG Inception Workshop	<ul style="list-style-type: none"> • Opening ceremony by the Minister on the Environment , Mr. Mohamed Moussa Ibrahim Balala, • Presentation by International consultant on the project including indicative outputs/activities, baseline projects and proposed risks; • Examination of proposed activities and potential risks/barriers by working groups;

Figure II – Agenda for the PPG Inception Workshop

**Programme de l'atelier de lancement du processus de la formulation du projet intitulé
« La mise en œuvre des technologies d'adaptation dans les écosystèmes fragiles des plaines
centrales de Djibouti »**

	08:00h – 08:30h	Accueil / Enregistrement Participants
Cérémonie d'Ouverture	08:30h – 09h00	<ul style="list-style-type: none"> • Mot de Bienvenue de SG du MHUE • Allocution du Ministre de l'Environnement
Présentation	09:00h – 09h30	<ul style="list-style-type: none"> • Objectifs et Programme de l'Atelier • Donner une vision d'ensemble du projet – cadre de travail proposé. • Présenter les coûts totaux du projet ainsi que les coûts par composants (1-4). • Discuter sur les activités proposées. • Proposer les projets de base. • Passer en revue les risques potentiels du projet.
09:30h – 10:00h Pause-Café		
Travail des Groupes	10:00h – 11:00h	<ul style="list-style-type: none"> • Discussion de la Groupe de Hanlé sur les Activités proposées • Discussion de la Groupe de Tadjourah sur les Activités proposées • Présentation des Rapporteurs de chaque groupe
Débat	11:00h – 12:00h	<ul style="list-style-type: none"> • Débat sur les activités du projet • Recommandations
	12:00h – 12:15h	<ul style="list-style-type: none"> • Clôture de l'atelier

Figure III – List of participants

PPG Inception Workshop for the LDCF UNEP project on Innovative Technologies for Fragile Ecosystems in Djibouti, PPG phase 25th May 2013, WHERE, Djibouti Ville, Djibouti

Liste des participants de l'atelier de lancement du processus de formulation du projet intitulé « la mise en œuvre des technologies d'adaptation dans les écosystèmes fragiles des plaines centrales de Djibouti » - Djibouti, le 25 mai 2013				
Noms	Institution	Email	Téléphone	Signature
TOBIN Cora	PNUE	Corachris11@gmail.com	+41786642272	
Abdourahman Y. Nour	Agence Nationale Météorologie	abdoul_korkor@yahoo.fr	77 68 44 09	
Yonis MAHAMOUD ADAR	MAPE-RH	yonisadar@yahoo.fr	77 81 20 57	
Mahamed Taher Abdallah	DATE	raouana7@hotmail.com	77 86 57 94	
Salifou MAHAMADOU	DATE	masalifou@yahoo.fr	77 03 28 02	
MARY Sidya	DATE	marysidyak@yahoo.fr	77-01-18-84	
YOUSSEF ELHELM ACHI	DATE	maoujpp1@tel-6	86 03 07	
Hamad Aboubaker Ach	DATE	Hamad_Aboubaker@hotmail.com	77 87 30 66	
Hass elmi Hiss	O.N.T.D	belmisy82@yahoo.fr	77.86.88.35	
Fate Ahmed Mohamed	DATE	hamadfate@yahoo.fr	77-76-45-66	
Ali Mohamed ABOURAKEN	REGION ^{PREFECTURE} de DJIBOUTI	ALI.MERANO@YAHOO.FR	77.81.99.50	
Jehin Amharo MOU	Council Regional Lodjane	jean_1@lojy.com	77 84 19 47	
Hassam Haissama gouda	ADIM		77 62 75 29	
Abdallah Ali Ahmed	CRIPEN	abdallahali@yaho.fr	77 81 58 13	

Youssef Ali Youssef	Direction Pêche	yosifali61@yahoo.fr	77831312	
Arafat Hassan Ahmed	Direction de l'économie	arafat_cavalier@yahoo.fr	77760088	
KAMILI BACHAR	Direction de l'économie	kamili_bachar@yahoo.fr	77645855	
Abdourahman Daher	ISU/CERD	abd_daher@yahoo.fr	77821484	
Idris Immel Mar	DATE/NUMÉ	distri_play@yahoo.fr	77854097	
Ochamed Elm:	DATE/ANNE	medmerou2004@yahoo.fr	351037	
Fouad Hassan Awada	DATE/ANNE	fouad-dj1@hotmail.com	77856504	
Youssef Dahr Robleh	Agriculture	Youssef_Dahr@yahoo.fr	77766322	
Hassan Hachou Atheg	DATE	samatis2016.com	77830700	
Youssef FETTER AyTASSO	DATE	magippp@hotmail.com	860307	
Aman Mohamed Aman	DATE	mandamin.com@gmail.com	77603180	
Karim elmi elis	D. N. T. J.	belmisy82@yahoo.fr	77868935	
Ali Mohamed Aboufayez	PREFECTURE TASSOUBA	AliMed10@yahoo.fr	77819950	
Fata Ahmed Mohamed	DATE	Ramoufata@yahoo.fr	77764546	
Hamad Moubaker Ali	DATE	Obaker_hamad@hotmail.com	77813066	
Medjed Djibul	DATE	med.djibul@yahoo.fr	21351097	
Abdoulou Ahmed	DATE		21737097	

Aldellah Gamil	CCD.		357070	
HANAN MOHAMED RAYANEH	DATE/MHUE	Saharaya@hotmail.fr	77639545	

Inception Workshop on the Formulation of the LDCF project on implementing adaptation technologies in fragile ecosystems of Djibouti's Central Plains

With the support of UNEP, the Ministry on Habitat, Urbanism and the Environment (MHUE) organized a workshop to involve Stakeholders in the development of the LDCF project, Implementing Adaptation Technologies in the Fragile Ecosystems of Djibouti's Central Plains. The workshop was held at the Chamber of Commerce in Djibouti Ville, Djibouti on the 25th of May 2013.

The goal of the LDCF project is to reduce community-level vulnerability to climate change by using innovative approaches to implement NAPA priority actions in fragile ecosystems. The objectives of the workshop were to introduce the project to Stakeholders, gain input and recommendations on project outputs and activities, detail baseline initiatives and discuss potential risks and barriers.

Workshop Description

The workshop included thirty-three participants from agencies such as the Ministry on the Environment, the Ministry on Agriculture, the National Meteorological Agency, the Research and Study Center of Djibouti (CERD), the Fishing Directorate, the Economic Directorate and representatives from the Tadjourah prefect and the Tadjourah regional advisory committee. The Hanle representatives could not be present, however, they were consulted on-site earlier in the week. The list of participants is attached.

The workshop included 4 sessions:

- Opening ceremony by the Minister on the Environment, Mr. Mohamed Moussa Ibrahim Balala
- Presentation by an International consultant on the project including indicative activities and financing;
- An examination of proposed activities and potential risks/barriers by working groups;
- Summary of workshop findings and conclusions

Opening Remarks

The Minister on the Environment, Mr. Mohamed Moussa Ibrahim Balala, expressed his motivation to see the success of the project. He indicated that people in these regions require means to adapt to climate change and methods to diversify their livelihoods in ways that can contribute to the restoration and protection of the fragile ecosystems. He stressed how Djibouti is suffering severe drought, desertification, deforestation, sea level rise and coastal zone degradation. The LDCF project provides an opportunity to build resilience to extreme weather / climate change. The Minister then took a role call to see which agencies were being represented. He described that the project must integrate the needs of different sectors including agriculture and fishing. He invited the participants to examine the project and make efforts to provide guidance for project elaboration.

II – Project Presentation

The International consultant then provided a presentation on the project outlining the costs for each of the three components, indicative activities as proposed by the regional heads (prefets) (who were consulted earlier in the week during site visits) and potential barriers and risks for the project. Baseline projects were also presented to ensure that all relevant

initiatives are accounted for and to see which projects can be built upon and used to co-finance the LDCF project.

Based on the presentation, the Minister on the Environment addressed the following points:

- A better synergy is needed between projects taking place in the same 2 regions such as with the Green Wall Initiative;
- The invasion of the non-native prosopis plant species in the Djiboutian natural environment is injuring livestock and proliferating rapidly;
- Rural populations must be made more self-sufficient by enabling them to generate revenue and use microfinance mechanisms for continual investments;
- Capacities of different governmental sectors must be reinforced as well as socio-professional organizations and cooperatives. A participative approach is required by implicating the general population and providing them training. Technical professionals must also be supported through knowledge-sharing and capacity building.
- All priorities must be outlined during project development such as reducing wind erosion with wind tolerant plant species.

After the remarks provided by the Minister, Stakeholders were invited to provide general comments / recommendations. The workshop provided a platform for information exchange between the Stakeholders, the National Director of MHUE, representatives of the MHUE and the International Consultant to clarify any issues. Subsequently, the Stakeholders were provided a list of proposed activities in both Hanle and Tadjourah and general risks. Each Stakeholder was allowed thirty minutes to provide feedback on the information.

III – Conclusions

The working session on activities and potential risks enabled the activities to be prioritized by the Stakeholders. General recommendations from the Stakeholders include the following:

- Conduct technical hydrological and hydrogeological studies on the capacity and quality of the groundwater supply in Tadjourah and Hanle
- Use an integrated watershed study approach in project design
- Protect native vegetation species and plant more salt and drought tolerant crops
- Reinforce capacities of existing and new cooperatives on water-conserving agricultural techniques, how to nourish livestock and how to use microfinance
- Reinforce existing management committees in these regions
- Reduce number of activities by creating strong synergy with other related initiatives
- Implement monitoring and evaluation for activities

The risk of implicating too many Stakeholders in project execution was also raised as a new risk which can delay project implementation. A proposed solution was to have a Stakeholder consultation framework and to clearly define the role of the Project Steering Board.

The workshop concluded by indicating that the revised activities will be formally agreed upon in a subsequent meeting to be led by MHUE. Stakeholders must be prepared to provide cost information for activities.

Figure V: Activités indicatives: Tadjourah
(Pas priorisés)

1. Etude sur le débit potentiel des forages (5 en totale, 1 à Marsaki, 1 à Abbouya, 1 à Kalaf, 1 à Walwalé et 1 à Onpekanuf)
2. Construire 5 forages avec les pompes solaires
3. Construire 2 réservoirs
4. Réhabilitation de 2 digues renforcées avec le gabion à Marsaki
5. Construction de 2 digues renforcées avec le gabion dans la région de Tadjourah avec la construction des micro-barrages en amont (utiliser le système 'Food for Work' pour le travail)
6. Canaliser l'eau des oueds à Magali et à Marsaki
7. Fournir les sites d'agropastoralisme avec le clôturage en métal, des pierres ou des ciments (pour combattre l'entrée de la sédimentation pendant les crues) et des plantes (pour combattre l'effet du vent fort), (1 ha par famille, nombre de famille dépendant sur l'étude de débit potentiel)
8. Développer des systèmes d'irrigation comme les conduits en PVC (ce matériel de conduit va éviter l'évapotranspiration) pour l'aménagement de l'eau aux sites d'agropastoralisme
9. Revitaliser la pêche à Marsaki avec l'achat des congélateurs avec les panneaux solaires, des bateaux avec les moteurs
10. Améliorer le système sanitaire pour les pêcheurs
11. Planter des mangroves à Kalaf (XX ha) pour stabiliser le sol et combattre les effets d'érosion
12. Faire une étude sur l'état de lieu sur les récifs coralliens aux Sables Blancs de voir comment les réhabiliter et les protéger
13. Contrôler l'invasion de prosopis par les enlever
14. Développer des plans pour un nouveau bâtiment pour les pêcheurs sur l'autre côté de la route
15. Développer un plan pour revitaliser et protéger l'ancienne région de l'aéroport de Tadjourah
16. Renforcer de capacité sur l'opération et la maintenance des bateaux avec les moteurs
17. Renforcement de capacité sur les groupes de gestion de l'eau sur la maintenance et la réparation des pompes
18. Renforcement de capacité des coopératives d'agropastoralisme sur la culture des palmiers dattier, la micro-irrigation, composter etc
19. Renforcement des coopératives sur les produits de micro finance pour l'agriculture et la pêche avec les conditions flexibles pour les prêts
20. Partage des connaissances pour les pêcheurs et un expert externe pour les suivre
21. Projet pilote sur l'utilisation de prosopis pour fournir le miel, le charbon et la nourriture pour des animaux
22. Introduction aux moyens de subsistance alternative (apiculture, pêche, aquaculture, mariculture, écotourisme et artisanat) à Tadjourah
23. Extension de SAP (Système d'Alerte Précoce) contre les inondations à Tadjourah (avec le soutien du CERD)

Figure VI: Activités indicatives: Hanlé (Kouli-Koma et Deralwa)
(Pas priorisés)

- 1) Etude sur la capacité des 2 forages (1 à Kouli-Koma et l'autre à Deralwa) en termes de débits potentiels
- 2) Réparer la pompe solaire dans le forage préexistant à Kouli-Koma pour les périmètres d'agropastoralisme
- 3) Installer une pompe solaire dans le forage préexistant à Deralwa
- 4) S'agrandir et préparer les sites de agropastoralisme avec le clôture en métal, des pierres ou des ciments (pour combattre l'entrée la sédimentation pendant les crues) et des plantes (pour combattre l'effet du vent fort), (1 ha par famille égal à 32 ha à Kouli-Koma et 40 ha à Deralwa)
- 5) Développer des systèmes d'irrigation comme les conduits en PVC (ce matériel de conduit va éviter l'évapotranspiration) pour l'aménagement de l'eau aux sites d'agropastoralisme
- 6) Réparer les tracteurs à Deralwa et donner la provision des outils pour les réparer
- 7) Construire 4 digues à Deralwa et à Kouli-Koma dans les oueds pour combattre les effets d'inondation (utiliser le système 'Food for Work' pour le travail)
- 8) Renforcement de capacité sur les groupes de gestion de l'eau sur la maintenance et la réparation des pompes
- 9) Renforcement de capacité des coopératives d'agropastoralisme sur la culture des palmiers dattier, la micro-irrigation, etc)
- 10) Renforcement des coopératives sur les produits de micro finance pour l'agriculture
- 11) Projet pilote sur l'utilisation de prosopis pour fournir le miel, le charbon et la nourriture pour des animaux
- 12) Extension de SAP (Système d'Alerte Précoce) contre les inondations à Hanlé (avec le soutien du CERD)

Figure VII: Proposed Levee Network and other Flood Protection Measures for the Existing Tadjourah Urban Zone
(Source: Rapport Esquisses TADJOURAH Final 08.03-13)

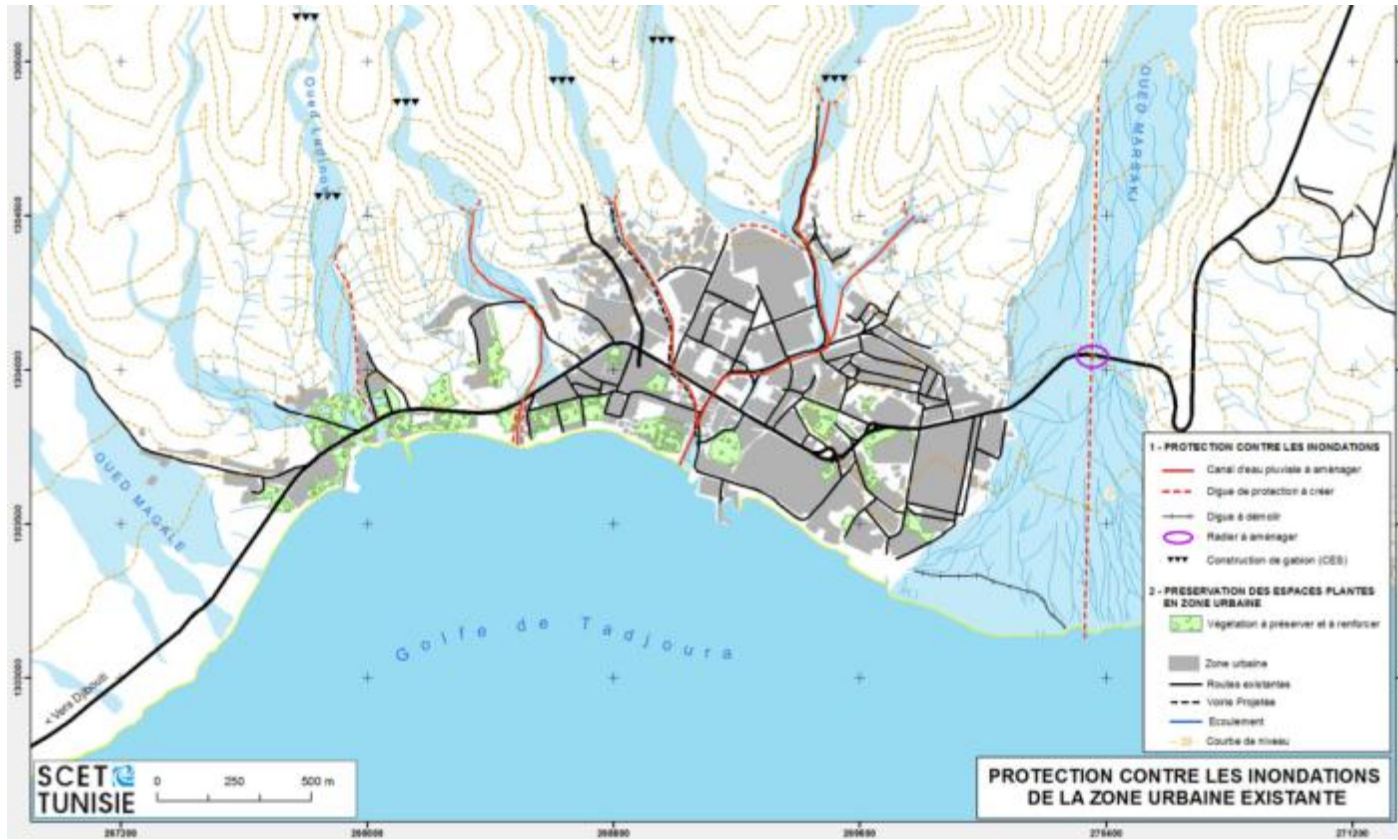
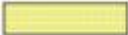


Figure IX: Map of Aquifer Depths in Djibouti

(Source: Master's Thesis, Abdourahman, H.G., 2002, CERD, *Modélisation Préliminaire de l'Aquifère Volcanique Régional de la Région de la Plaine de Hanlé, République de Djibouti*)

Les systèmes aquifères en RDD

-  Aquifère inféroflux (2 à 15 m). Alluvions. Correspond au réseau hydrographique inapparent à cette échelle.
-  Aquifère peu profond (100 à 200 m)
Roches sédimentaires
-  Aquifère peu profond (100 à 200 m)
Roches basaltiques et rhyolitiques fissurées
-  Aquifère régional (200 à 1000 m)
Roches volcaniques fissurées
-  Nappes saumâtres
-  formations holocènes

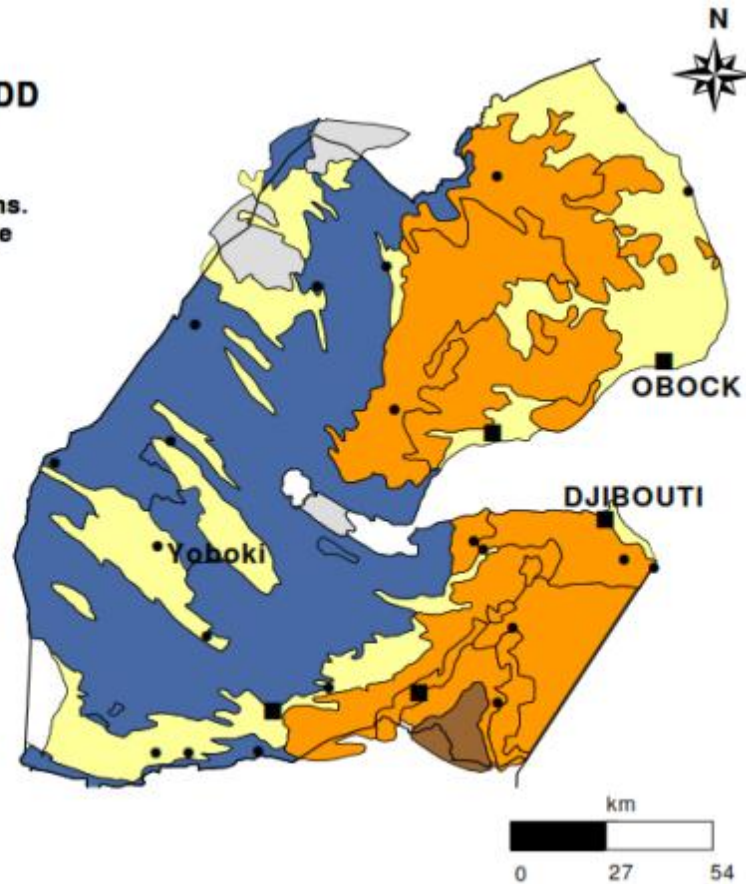
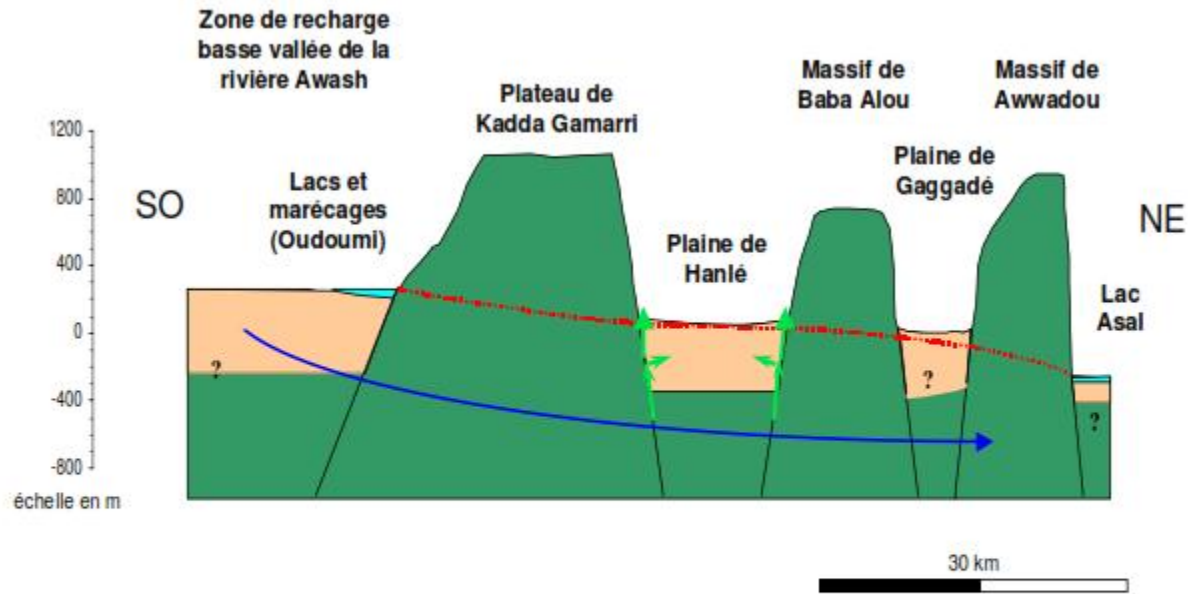


Figure X: Groundwater movement from Ethiopia to Hanle plains
 (Source: Master's Thesis, Abdourahman, H.G., 2002, CERD)

Figure 20: Schéma du profil de la région Sud-Ouest



- Niveau du potentiel de la nappe captive volcanique régionale
- Ecoulement global de la nappe volcanique régionale
- Transfert d'eau de l'aquifère volcanique vers l'aquifère sédimentaire à Hanlé

Figure XII: Stakeholder Involvement Plan

The project design was formulated as a result of extensive bilateral and multilateral stakeholder consultations as well as two comprehensive workshops. The goal of stakeholder consultations has been to identify relevant agencies involved with restoring and protecting fragile ecosystems in Djibouti's Central Plains. Consultations have ensured the proposed project is grounded in local realities whilst being aligned to national policy.

The following table shows the list of consultations which have taken place to develop the LDCF project document. The project outcomes, outputs and activities are based upon the recommendations of the Stakeholders given the technical, operational and financial constraints of the project. The role and participation of each agency is indicated by the column headings described in the legend.

Column Heading Legend

National Inception & Validation Workshops – involved in inception (May 2013) and validation workshops. The National Inception Workshop involved 33 participants in total.

Involvement in Baseline Assessment – consulted during project development to expand upon baseline initiatives

Role Identification – Identification in institutional arrangement

Risk/Barrier Analysis – consulted on their specific institutional risks or barriers

Policy/ Strategic alignment to priorities – institution has policies/strategies which will be amended to have more sustainable land-use planning

Co-financing Identification – other projects to support and be supported by the UNEP LDCF project financially

Gender representation – organization which is concerned with promoting the involvement of rural women in project development

Upscale / Sustainability planning – consulted on how to maintain and duplicate the project activities

Document Endorsement – signatures obtained from government and UNDP CO

Table 2: Stakeholder consultation plan (on-going consultations) in Djibouti, UNEP LDCF Project

Stakeholder	National Inception & Validation Workshops	Involvement in Baseline Assessment	Role Identification	Risk/Barrier Analysis	Policy/Strategic alignment to priorities	Co-financing Identification	Gender representation	Upscale / Sustainability planning	Document Endorsement
Federal/Sector									
Ministry on Habitat, Environment and Urbanism (MHUE), Direction on Land Use and the Environment (DATE),	X	X	X	X					
Direction on Rural Hydraulics (DRH) within the Ministry of Agriculture, Livestock and Hydraulic Resources (MALHR)		X	X						
Direction of Fishing	X	X	X	X					
Direction of Economy	X	X	X	X					
National Meteorological Service	X	X	X	X					
Djiboutian Agency for Social Development ADDS (PIP for INDS)		X	X	X		X			

Stakeholder	National Inception & Validation Workshops	Involvement in Baseline Assessment	Role Identification	Risk/Barrier Analysis	Policy/ Strategic alignment to priorities	Co-financing Identification	Gender representation	Upscale / Sustainability planning	Document Endorsement
Implementation									
Technical / Research Institutions									
CERD	X	X	X	X		X			
Private Sector									
Port of Tadjourah						X			
Regional/ Sector									
Regional Advisory Committee of Tadjourah		X	X	X					
Regional Advisory Committee of Hanle		X	X	X					
NGOs/CSOs									
Womens Artisanal NGO Tadjourah		X	X	X			X	X	
Donor Partners									
FADES						X			
PROMES (WB)						X			
Islamic Development Bank						X			

Stakeholder	National Inception & Validation Workshops	Involvement in Baseline Assessment	Role Identification	Risk/Barrier Analysis	Policy/ Strategic alignment to priorities	Co-financing Identification	Gender representation	Upscale / Sustainability planning	Document Endorsement
European Union									

Figure XIII: Press Release

Ecosystèmes Fragiles face aux Changements Climatiques

Rendre les populations rurales plus résilientes

« Processus de formulation du projet de mise en œuvre des technologies d'adaptation dans les écosystèmes fragiles des plaines centrales de Djibouti », c'est l'intitulé de l'atelier organisé samedi dernier par le ministère de l'Habitat, de l'Urbanisme et de l'Environnement dans la salle de conférence de la Chambre de Commerce de Djibouti. L'ensemble des différentes institutions et parties prenantes engagées dans le plan d'adaptation au changement climatique se sont retrouvées autour du ministre de tutelle, Mohamed Moussa Ibrahim Balala, et de ses principaux collaborateurs.

LES effets du Changement Climatique se répercutent violemment sur les écosystèmes fragiles des plaines centrales de notre pays. C'est qui est notamment le cas dans les zones du littoral de la ville de Tadjourah ou dans la plaine de Hanlé dans la région de Dikhil. C'est dans ce contexte que notre pays a obtenu le financement d'un projet visant à « Réduire la vulnérabilité au niveau local par la mise en œuvre des actions prioritaires (concrètes) du PANA dans les écosystèmes fragiles de Djibouti, et ce, par l'utilisation d'approches innovantes ». Projet soutenu par le Fonds pour les Pays les Moins Avancés (LDCF) et qui vise à répondre aux besoins d'adaptation des Pays les Moins Avancés (PMA) et de financer les besoins d'adaptation qui sont urgents et immédiats. D'un montant total de 7,36 millions de dollars US avec des sources de cofinancement sur une durée de 5 ans, le projet exigeait néanmoins la satisfaction à certains critères d'éligibilité lors de l'octroi de ce financement par la LCDF. Il s'agissait notamment de la mise en œuvre d'une Approche participative et axée sur les pays, la Mise en œuvre des priorités du PANA, et enfin l'adoption d'une approche multidisciplinaire et la promotion de l'égalité des sexes.

L'atelier de samedi dernier visait à donner une vision d'ensemble du projet et du cadre de travail proposé. Plus généralement, ce projet s'articule autour de quatre composantes essentielles. Tout d'abord, un accent particulier sera mis sur la protection contre les dangers dus aux changements climatiques en lien avec l'eau avec un coût de 2,295 millions de dollars US. Parallèlement, une composante «réhabilitation, rétablissement et résilience de l'écosystème sera développée à hauteur de 1,75 millions de dollars US. Une enveloppe de 1,75 millions de dollars US sera accordée aux moyens de subsistance durables et sûrs seront. Enfin, un demi-million de dollars US sera alloué au renforcement de capacité des institutions. Lors de la rencontre d'hier matin, une experte mandatée par le Programme des Nations Unies pour l'Environnement, Dr Cara Tobin, Ingénieur Environnemental et Hydrologue, a fait le tour du projet en termes de coûts totaux ainsi que les coûts par composants de 1 à 4. Par ailleurs, elle a proposé une discussion ouverte sur les activités proposées dans le cadre de ce projet et a sollicité d'autres propositions de la part des participants pour les projets de base. Parallèlement, les risques potentiels du projet ont pu être passés en revue avec les experts, les techniciens et les autres parties prenantes dans ce chantier qui vise à adapter les écosystèmes fragiles aux effets du Changement Climatique.

Rappelons que dans une première phase de collecte des propositions formulées par la société civile dans les sites visés par ce projet, en l'occurrence la zone côtière de Tadjourah et la plaine de Hanlé, plus d'une quarantaine d'activités ont été formulées. L'on relève essentiellement trois ou quatre axes de travail principaux dont notamment l'amélioration des systèmes d'adduction et d'irrigations des eaux souterraines et de surfaces, mais aussi le renforcement des capacités des pêcheurs et des coopératives agropastorales pour accroître la résilience grâce à l'utilisation du Prospect et des produits agricoles et de pêche, et enfin le développement de nouveaux moyens de subsistance comme l'aquaculture, l'aquaculture, la mariculture, l'écotourisme et l'artisanat.

Rappelons que le ministre de l'Habitat, de l'Urbanisme et de l'Environnement, Mohamed

Moussa Ibrahim Balala avait dans une allocution prononcée au lancement de l'atelier, souligné que le projet dont la formulation avait lieu au même moment, constituait la seconde série d'interventions visant à traiter les besoins urgents et immédiats en matière d'adaptation au changements climatiques tels qu'ils sont exprimés dans le PANA de Djibouti. « Ce projet sera mis en œuvre dans la plaine côtière de Tadjourah ainsi que dans la plaine de Hanlé. »

Le ministre a rappelé en outre les quatre grands volets dans lesquels s'inscriront les activités du projet, en l'occurrence la lutte contre les effets du changement climatique liés à l'eau, la promotion de la réhabilitation des écosystèmes vers la résilience et le rétablissement des systèmes de production, la soutien de l'identification des voies de développement résilientes et durables et des moyens de subsistance pour les communautés vulnérables et enfin une série d'initiatives de renforcement des capacités institutionnelles ciblées. »

Au terme des discussions préliminaires sur l'identification des risques potentiels, les différentes institutions et parties prenantes ont été invitées à formuler à leur tour des propositions d'activités dans le cadre de l'exécution du projet. Des propositions qui feront l'objet de réflexions et qui aboutiront sur des choix prioritaires pour les activités à entreprendre.

M45



Figure XIV: Photo of new technology to make use of Prosopis



Appendix 12: Summary mission 2

UNEP LDCF project: Djibouti Mission Report

International consultant: Lucille Palazy, C4 EcoSolutions

Dates of mission: 20 June – 3 July 2011

Project title: Implementing adaptation technologies in fragile ecosystems of Djibouti's Central Plains.

A mission was undertaken to Djibouti in order to gather information to develop the Djibouti LDCF2 Project Document for submission to Global Environment Facility (GEF) Board. Additionally, the validation workshop of the project has been held with the stakeholder at the end of the mission. Numerous meetings were held in Djibouti city with a range of Government departments, as well as associations and local communities in the study sites of the LDCF project. A two days field survey was undertaken to Hanlé plains and Tadjourah with two National Consultants. Key stakeholders consulted and actions undertaken during the mission are detailed below.

- Meetings were held with the following Government departments:
 - Directorate on Land Use and the Environment (DATE) of the Director of the Ministry of Habitat, Urbanism and Environment (MHUE);
 - Department of Water of the Ministry of Agriculture, Fisheries, Livestock and Hydraulic Resources (MAPE-RH);
 - Operational Department of the MAPE-RH;
 - Office of Project Management of the MAPE-RH;
 - Ministry of High Education and Research (MESR)
- Meetings were held with the following associations:
 - Agropastoralist Association of Hanlé
 - Women Association for Handcraft in Tadjourah; and
 - Women Association for Handcraft in Hanlé.
- Meetings were held with representants from the following international partners
 - FAO
 - UNDP

Stakeholder consultations were conducted throughout the week of mission. Those consultations enabled to define precisely the activities that would be proposed to GEF for funding. The time-table of the meeting and the subjects of discussion are detailed in the table below.

Table 1: Djibouti Project LDCF2 mission meetings:

No	Date	Time	Name	Organization	Position	Contact
1	31/08/13	9h30-12h00	Houssein Rirache	MHUE	Director	Discussion about the activities of each component and the information collected by the MHUE since the inception workshop in May 2013.
			Abdallah Barkhat Ibrahim	MHUE	National Consultant	
			Said Kaireh Youssef	MHUE	National Consultant	
			Dini Abdallah Omar	MAPE	General Secretary	
2	31/08/13	12h00-14h00	Mohamed Moussa Ibrahim	MHUE	Ministor	Discussion about the development of agropastoralism particularly the importance of not giving anything freely. It is crucial for the communities to invest their time and energy to develop their ownership of the project.
			Houssein Rirache	MHUE	Director	
			Abdallah Barkhat Ibrahim	MHUE	National Consultant	
			Said Kaireh Youssef	MHUE	National Consultant	
			Dini Abdallah Omar	MAPE	General Secretary	
3	01/09/13	7h00-18h00	Houssein Rirache	MHUE	Director	Field mission in Hanlé to the agropastoral plots of : <ul style="list-style-type: none"> - Liliyabouri - Afaloina - Kouidi Koma - Oued d'Harou Meeting with the representants of the Agropastoral Association of Hanlé
			Abdallah Barkhat Ibrahim	MHUE	National Consultant	
			Said Kaireh Youssef	MHUE	National Consultant	
4	02/09/13	7h00-18h00	Houssein	MHUE	Director	Field mission in Tadjourah to :

	3		Rirache			<ul style="list-style-type: none"> - Darkenlé (site for the construction of agropastoral plots) - Kalaf (site for the construction of agropastoral plots and mangrove restoration) - Marsaki wadi - Ad bouya plains
			Abdallah Barkhat Ibrahim	MHUE	National Consultant	
			Said Kaireh Youssouf	MHUE	National Consultant	Meeting with the prefet of Tadjourah
5	03/09/13	17h00-19h30	Said Kaireh Youssouf	MHUE	National Consultant	Meeting to define the budget of the activities related to water availability (component 1 of the LDCF project)
6	04/09/13	10h00-12h00	Houssein Rirache	MHUE	Director	Discussion about the activities planned in the first Component of the LDCF project, their budget and discussion about the partnership of the PHUE and MAPE-RH on the project.
			Abdallah Barkhat Ibrahim	MHUE	National Consultant	
			Said Kaireh Youssouf	MHUE	National Consultant	
			Aouled Djama Ahmed	MAPE-RH	Operation Director	
			Kamil Daoud Ali	MAPE-RH	Chief of water resources department	
7	05/09/13	10h30-12h00	Abdallah Barkhat Ibrahim	MHUE	National Consultant	Discussion about the cost of the agropastoral activities (buying crops, fodder species and tree species), where to buy and transport options.
			Omar Osman Ahmedin	FAO	Officer for the monitoring of the Risk project	
8	05/09/13	12h00-14h00	Abdallah Barkhat	MHUE	National Consultant	Discussion on the activities of the second and third components of

			Ibrahim			the LDCF project, addition of details to the activities and estimation of their budget
9	06/09/13	15h00-18h00	Jalludin Mohamed	MESR	General Director of the National Research Center (CERD)	Discussion about the technical studies necessary to have the required knowledge on current and future water availability in the study sites, discussion of the feasibility studies necessary to build the boreholes and the agropastoral plots
10	11/09/13	13h00-14h00	Sidya Mary	Ministry of the Interior	Risk Management Secretary	Discussion about how the LDCF project could support the increase of local communities awareness regarding risks and extreme climate events.
11	12/09/13	9h30-12h30	Validation workshop			
12	12/09/13	12h30-13h30	Samatar Abdi Osman	MESR	Project Coordinator of the Risk Management Project at the CERD	Discussion about how the LDCF project could support the implementation of an EWS in the study sites.
13	12/09/13	13h30-14h30	Dini Abdallah Omar	MAPE	General Secretary	Validation of the list of baseline projects and agreement on the organisation to obtain the cofinancing letters.

Appendix 13: Validation Meeting

Validation workshop report:

The following stakeholders participated to the validation workshop:

Liste des participants à l'atelier de validation du projet LDCF 2 intitulé "Mise en place de techniques d'adaptation dans les écosystèmes fragiles des Plaines Centrales de Djibouti" - Djibouti, 12 Septembre 2013

Nom	Institution	Email	Signature
1 AHMED HOUSSEIN BOUH Abdoulkader Doudoum Abdallah	Ministère de l'Environnement M.HUE	popo.djibouti@yahoo.com jueddam@hotmail.com	[Signature]
3 Ali Homod Ali Jalludin Abdou el	coopérative de Houleli CERO	jalludinmoh@yahoo.com	[Signature]
5 Saïd Kaouh	Consultant-FAO DAEPE/DNA	sakayou@yahoo.fr	[Signature]
Youssef Daker Robert	DAF/DAEPE	youssef.daker@yahoo.fr	[Signature]
7 Abdourahman Saher SAMIR ABEN OSMAN	ISV/CERO CERO	abd.daker@yahoo.fr samiranaboli@yahoo.fr	[Signature]
9 Abdoulkader Ibrahim Egh Sahel Doudou Sahel	Of P/Agro DGT/DAEPE	aydid2001@yahoo.com doudoukate@yahoo.fr	[Signature]
11 Omar DINA ARIAM AHMED ABDUL-GALIL	Préfet/Agri/Int. (7783356) DE/DAEPE-RI	ahmed_covatic@yahoo.fr	[Signature]
13 Mohamed Ahmed Djiboul SOUBRIGA P. Aminou Camille	DATE SEL/MHUE	moh.djiboul@yahoo.fr soubry75@yahoo.fr	[Signature]
15 MARY Sindya Othman Elmouhich	DATE DATE	marysindya@yahoo.fr medmiron2004@yahoo.fr	[Signature]
17 Idrid Imaneïl Nour HOUSSEIN RI RACHO	DATE/MHUE DATE/MHUE	distri-play@yahoo.fr housseinriach@yahoo.fr	[Signature]
19 Dini Abdallah	MHUE	dini_omni@yahoo.fr	[Signature]
20 Lucile PALAZI	C4 scolarisations	lucile.palazy@chres.eco.rg	[Signature]

The following points have been discussed during the workshop:

Hydrological studies:

- The modelling on ground water in Tadjourah has already been conducted. It only needs updating with the new data. In Hanlé, extensive studies are necessary to invest water availability.
- In Djibouti, the weather forecast agency is responsible for the general climate study at the National scale. For any site specific studies, it is the CERD that is in charge. The CERD then provide this information to the weather forecast agency.
- Hanlé does have a lot of underground water as it is located between the Awash River in Ethiopia and the Assal Lake located at 155 meter below sea level.
- At the National scale, Tadjourah is among the most vulnerable city to flooding.
- A hydrological study on surface water is very necessary in both sites. However, the CERD did not manage to find any expert in surface water to hire yet.

Agropastoral activities:

- The estimation of the rural population size of 120 000 people needs to be update.
- The participative approach for the construction of the agropastoral plot and the development of alternative economic activities is crucial.
- In the agropastoral plots, a composting structure is necessary.
- Training to management should be provided to the local communities.

Handcraft activities:

- The transfer of knowledge between the women craft association of Tadjourah and one in Yoboki has already been tried. The women of the AFT refused to do that. Hence, other associations from Djibouti Ville have been contacted. 5 days of training have been provided to approximately 30 women. The protocol for that activity will be duplicated by the LDCF project.

Aviculture:

- Aviculture development has failed in 3 sites. The wrong chicken breed was provided to the farmers. Ethiopian chicken that are well-adapted to droughts should be used. Aviculture introduction was a success in the Barah region. Introducing it as a family activities raiser then a community activity should work much better.

Apiculture:

- The FAO is funding an apiculture development project. Both projects should work in collaboration.

Ecosystem restoration activities:

- In Hanlé, the restoration of Acacia forests should actually not be limited to Acacia species. *Salvadora persica*, *Cadaba rotundifolia* and *Opuntia ficus-indica*. Fig opuntia (*Opuntia ficus-indica*) has a strong root system. Additionally, the seed can be used to produce highly valued cosmetic oil. It can as well grow in area that only have 50 mm of rain per year.

Economic activities:

- The access of people to micro-credit is very important. Finance system already exists in both regions (CEPEC). A consultant from the Adaptation Fund project is going to investigate those financial options in the region of Barah. The report will be shared with the LDCF project board.

Additional indicators:

- The pumping rate of 20 m³ per hour for the irrigation of the agropastoral plots cannot be used as an indicator as presented as it will be different between Hanlé and Tadjourah.

- The number of people protected from floods thanks to the hard infrastructures build by the project should be added as an indicator.
- The concentration of salt in the soil could be taken as an indicator.
- An indicator should be developed to measure the durability of the investments made. In other words, to measure the probability that the local communities with take ownership of the project and continue the activities after the end of the project.

Additional risks:

- The attention was raised to the fact that the stakeholders should find a way to convince local community to stop illegal activities like the transport of people from one country to the other and embrace the new activities proposed by the LDCF project.
- Volcanic activity should be added to the risks as well. Indeed, in 1989, the epicentre of earthquake of a magnitude 6 was very close form Hanlé (in Domi).
- In the past, in Kalaf, the communities have already been opposed to environment project. It is necessary to double that we have their agreement for the project.

Institutional structure of project implementation:

- The risk management secretary should be added in the list of partners. They have already installed several pluviographs in Tadjourah.
- A meeting will be held between the different stakeholders after the validation meeting to discuss on the institutional structure of the project.

Appendix 14: Mission report of the first National consultant, M. Abdallah Barkat

Rapport de mission relatif au secteur de Hanlé (région de Dikhil), 1 au 2 aout 2013

L'équipe de la mission était composée de :

- M. Houssein Rirache : Directeur de l'environnement
- M. Said Kaireh : consultant national en hydraulique
- M. Abdallah Barkat : consultant national en agriculture et élevage

L'équipe a rencontré à Dikhil le préfet de la région, M. Mohamed Cheiko et Dikhil adjoint M. Youssouf.

Ensuite des entretiens ont lieu avec successivement les exploitants du périmètre agropastoral (PAP) de Koudi Koma, ceux du PAP de Liliya bouri et enfin avec les producteurs des exploitations traditionnelles et les éleveurs traditionnels.

1. Koudi Koma

Les producteurs, au nombre de 32 sur une superficie totale de 8 ha, essaient tant bien que mal de maintenir en vie le palmier dattier in vitro. Au démarrage du PAP chacun des exploitants a bénéficié de 25 palmiers dattiers. Depuis 3 ans à cause du déficit en eau d'irrigation le nombre de palmier dattier par exploitant varie de 5 à 15 pieds. A cause de l'insuffisance d'eau d'irrigation ils ne peuvent pratiquer les autres cultures telles que fourragères, maraichères, arboriculture fruitière. D'où la nécessité d'un forage propre au PAP.

Il y a 2 forages à Koudi Koma. Le premier forage avec un bon débit (voir volet eau) est destiné à la population et leur bétail. Près de 140 ménages s'approvisionnent en eau à ce forage de Koudi Koma. Le second forage plus récent équipé de panneaux solaires alimente le PAP. Cependant son débit est insignifiant, près de 10 m³/j, comparativement au besoin d'un PAP de 8 ha.

De ce fait, les 32 exploitants cotisent entre eux pour acheter du gasoil, à raison de 30 000 Fd/mois, pour maintenir en vie leur palmier dattier. Pour cela il utilise le forage équipé d'un groupe électrogène qui a un bon débit mais destiné à l'alimentation humaine et animale.

Les participants, au nombre d'une dizaine, mentionnent le besoin des éleveurs transhumants en citernes enterrées destinées à la consommation humaine au nombre dans le secteur d'Asbahari, Da:ada et afo af.

Concernant les activités génératrices de revenu relatives au genre, les femmes, en plus des besoins de leur ménage, pratiquent de l'artisanat à base des feuilles de palmier doum (*Hyphaena thebaica*) pour la vente des produits.

Pour ce qui est des parcours naturels, les mise en défens sont possibles sur les sites suivants : Asbahari où on trouve Amanto, Bili, Danouni et Darmaito. L'ainé des participants indique que la question de mise ne défens devra être traitée avec les 2 okals généraux : M. Med Ali entre Kontali et Garabayis et M. Ali Barouli.

Récapitulatif des besoins

- Améliorer l'accessibilité de l'eau d'irrigation (nouveau forage équipé de panneau solaire)

- Couvrir le réservoir d'eau de l'exploitation en vue de réduire l'évaporation et éviter le passage des éléments fins dans le réseau d'irrigation. Le volume du réservoir est de 12 m x 12 m x 2,5 m
- Remplacement des cornières supportant la clôture grillagée
- Former les agro-éleveurs aux bonnes pratiques en agro-d'élevage pouvant contribuer à améliorer leur rendement
- Contribuer à sécuriser la santé animale
- Contribuer à l'accroissement du disponible fourrager des parcours (travaux de CES, mise en repos, re-semis et régénération assisté d'arbres et arbustes)
- Diversification : aviculture familiale

2. *Liliya bouri*

Le PAP de Liliya Bouri a une superficie totale de 10 ha répartie à 42 exploitants. Il doit être irrigué à partir du forage. A ce jour, le groupe électrogène alimentant le forage est en panne, le réseau d'irrigation est bouché à certains endroits selon les participants.

Aussi, étant donné que le réservoir d'eau est resté sans eau pendant un certains temps, il présente des fuites.

Au PAP de Liliya Bouri, chacun des exploitants ont bénéficié de 35 plants de palmier dattier in vitro. Aujourd'hui faute d'irrigation près de la moitié de l'ensemble de ces palmiers dattiers sont sénescents et nécessitent un sauvetage d'urgence.

Au début le palmier doum constituait le brise vent et les cultures suivantes étaient pratiquées : fourrages, les melons, pastèques, tomates.

Récapitulatif des besoins PAP de Liliya Bouri

- Réhabiliter le réservoir d'eau d'irrigation. Volume du bassin : 2,90 m x 10 m x 9,5 m soit près de 280 m³
- Equiper le forage en moyen d'exhaure à énergie renouvelable (énergie solaire)
- Diversification : aviculture
- Formation en agro-élevage

3. *Exploitations agricoles traditionnelles*

Il y a près de 200 exploitations mais seulement un effectif de 80 sont en activités en ce moment. Parmi les exploitations en activités 10 possèdent les puits et bassins aménagés. Les réseaux d'irrigation de l'ensemble des exploitations sont constitués de sagaia.

La coopérative agricole de Hanlé met aussi l'accent sur le problème logistique pour acheminer les productions sur le marché de la capitale. Aussi l'absence d'une structure de micro crédit prêtant aux agro-éleveurs est mentionnée. Les membres actifs de la coopérative cotisent une somme de 500 Fd par mois par exploitants.

Il est indiqué aussi que la plupart des exploitants travaillent eux même la terre mais une minorité ayant les moyens font appel à des salariés en provenance de l'Ethiopie.

Certains exploitants indiquent leur souhait d'expérimenter les cultures maraichères sous abri afin de baisser la température au niveau des parcelles et le système d'irrigation aux gouttes à gouttes.

Les productions des exploitations traditionnelles classées par ordre d'importance sont : fourrages, oignon, tomate, melon. A titre indicatif 200 caisses de 18 kg chacune et un camion de près de 4 m³ de fourrages sont commercialisées tous les 3 mois.

Les arbres fruitiers sont peu développés mais certains souhaitent notamment la culture du goyavier et du citronnier après bien sur formation des producteurs et fournitures des plants adaptés.

Lors de nos entretiens l'option d'alimenter en eau d'irrigation ensemble un groupe de jardin (4 à 6) selon la capacité du puits a été discutée. Les productions n'ont pas d'objection à cela à condition de couvrir les besoins en eau du groupe.

Les ennemies des cultures sont citées parmi les principales contraintes entravant le développement des cultures maraichères et fruitières.

Avant une ONG internationale basée à Hanlé avait un atelier de mécanique et fournissait les prestations suivantes :

- réparation des moto pompes
- fourniture de moto pompe de secours
- vente de pièces détachées pour moto pompe
- vente de pompes à pédale importées

Récapitulatif des besoins

- des exploitations agricoles traditionnelles
 - Protection des berges en gabions au niveau de 3 sites : Issih Wehé, Tewao et Dawano.
 - Aménagement des puits et bassins : il est possible d'aménager un puits équipé de panneaux solaire pour alimenter en eau d'irrigation un groupe de 5 exploitants mitoyens.
 - Equipement en moyen d'exhaure à énergie renouvelable
 - Formation des agro-éleveurs aux différentes techniques culturales et d'association de la production animale
 - Introduction des méthodes de lutte intégrée contre les ennemies des cultures
 - Intrants vétérinaires pour soigner les animaux domestiques
 - Fourniture de chèvres bonne laitière à un échantillon des exploitants répondant aux critères de contribution propre.
 - Fourniture de 2 « presse à foin » pour faciliter le stockage et la commercialisation du foin.
 - expérimentation de l'agriculture sous abri
 - Initiation expérimentale à l'irrigation aux gouttes à gouttes pour les petits exploitants
 - Faciliter d'un moyen logistique à la coopérative destiné à la commercialisation des produits agricoles
 - Artisanat
- Parcours et élevage pastoral

Les sédentaires possèdent un effectif réduit de chèvre en moyenne 5 têtes. Alors que les transhumants possèdent en moyenne près de 50 têtes de petits ruminants.

Il a été affirmé que beaucoup de ménages complètent leur revenu avec la vente de charbon de bois à base essentiellement du prosopis.

La décision de mise en défens de certains sites d'intérêt pastoral nécessite une concertation entre les usagers en présence des responsables coutumiers. Et les participants sont favorables à cela et ont indiqué quelques sites potentiels suivants : Dawano, Rareyta et Guinibad. Toujours dans le domaine pastoral, les sites d'intérêt pour les travaux de conservation des eaux et des sols sont : Dadolé, Gohani, Rareyta, Sarouli af et Dalaha

Malo. Lors de notre dernière réunion du 1 septembre 2013, 2 autres sites importants sont mentionnés : Salimoli Douloul et Kafimlou. Le choix définitif des sites devant se faire lors de l'élaboration du schéma d'aménagement, un certain nombre d'ha de mise en défens sera budgétisé.

La plaine endoreique d'Agna possède un bassin versant important et est inondée, pendant 2 semaines à un mois, au moins 2 fois par an. Cette énorme quantité d'eau s'évapore au gré des vents dominants. Les travaux de CES (lentilles de rétention, fossés et autres) sont aussi prévus à l'embouchure de l'oued Hanlé pour utiliser une partie de cette eau à des fins de restauration des écosystèmes. Ces ouvrages resteront en eau quelques semaines après le retrait de l'eau de la plaine. Les espèces présentes en périphérie tels que le Sueda et le Sporobolus helvolus peuvent y être développées. L'Acacia nilotica espèce à multiple usage et supportant l'inondation peut aussi s'y installer à l'image des expériences positives conduites dans des plaines similaires. Toutefois un tracteur de 150 cv, une charrue buteuse et une benne sont nécessaires pour réaliser ces travaux. Il est clair que ces équipements pourront être utilisés et optimisés dans le cadre des projets de changements climatiques incluant un volet pastoral notamment pour la scarification des sols avant le semis des graminées à bonne valeur fourragères.

Le traitement avec gabions ou pierres sèches est sollicité au niveau d'une zone à bon pâturage objet de l'érosion hydrique. Le nom du lieu-dit « Andido » qui veut dire tranchée indique le type d'érosion et la nécessité de mettre en place des ouvrages favorisant l'étalement des eaux de ruissellement plutôt que son passage au sein d'un seul canal.

4. Projets intervenants dans la zone

Projets d'aides d'urgence de la FAO

La FAO a fourni des ruches avec le matériel et équipement nécessaire. Lors de notre visite quelques colonies ont été visitées mais pour l'instant il n'y a pas eu de récolte. De plus dans le cadre des petits programmes d'urgence, la FAO a aussi fourni à la coopérative de Hanlé :

- un moulin pour moulin les gousses de prosopis (arbustes envahissants)
- un matériel pour la fabrication de charbon de bois toujours à partir du prosopis.

Certains jardins bénéficient d'un appui ponctuel en outillage agricole. Aussi la FAO a démarré la phase d'expérimentation et promotion de l'irrigation aux gouttes à gouttes.

Projet de Développement Rural Communautaire et Mobilisation des Eaux (PRODERMO)

Ce programme de développement rural, exécuté aussi par le MAPERH et financé par la BM, couvre des zones pilotes de 2 régions du pays. L'objectif du projet est d'augmenter l'accès des communautés rurales à l'eau et renforcer leur capacité de gestion des ressources hydrauliques et agropastorales à travers une approche participative.

Les activités de terrain étant en cours aucun rapport d'activité n'est disponible.

Risque

les PAP alimentés à partir du forage à énergie thermique et même énergie solaire à montrer ses limites.

Donc à Hanlé ne pas développer de PAP basé sur les nappes trop profondes mais se baser sur l'exploitation des nappes peu profondes 4 à 10 m. mais sécuriser la disponibilité de l'eau d'irrigation des 2 PAP existants.

Face à ce constat il faudra au mieux appuyer les exploitants en activité pour contribuer à l'accroissement de leur rendement.

Rapport de mission relatif à la plaine cotière de Tadjourah (région de Tadjourah), 21 au 23 août 2013

Equipe de la mission :

- M. Abdoulmalik : préfet de Tadjourah
- Dini Abdallah Omar : Secrétaire général du MHUEAT
- Hassan Houssein : président du conseil régional de Tadjourah
- M. Abdallah Bourhan : sous directeur régional de développement rural
- M. Moussa Mohamed Abdallah : chef de secteur de l'élevage
- Said Kaireh : consultant national
- Abdallah Barkat : consultant national

1. Entretien avec les autorités locales

Secrétaire général

le programme comprend les composantes suivantes :

- Aménagement de la digue de protection de la ville de Tadjourah surtout au niveau de l'oued Marsaki (renforcement de la digue à l'embouchure, réalisation des seuils en gabion ou pierres maçonnées en amont)
- Réalisation de forages destinés aussi bien à l'alimentation en eau des populations que pour l'irrigation des Périmètres Agro-Pastoraux (PAP)
- Aménagement des nouveaux PAP dans les différents sites caractéristiques

Lors de notre précédente visite, il avait été question de 6 forages. Il serait bon de voir ensemble la répartition de ces 6 forages entre les PAP et l'alimentation humaine.

Préfet

l'ONG SOS sahel, Coopération Japonaise ont été évoqués comme intervenants dans la région. La JICA souhaite conduire une expérimentation en matière d'agriculture.

Concernant les PAP, les sites suivants ont été suggérés à condition de trouver l'eau et l'espace appropriés : Kalaf, Afaloïna et Roueli (cad Bouya).

Ce projet de changement climatique concerne la zone cotière dont il faudra indiquer la largeur. Compte des besoins des populations et la nécessité d'intervenir sur une partie des bassins versants une bande de 10 à 15 km à partir de la cote est préconisée pour l'implantation des activités du projet.

Pour les PAP les sites suivants sont proposés :

Afaloïna : situé à 15 km en amont sur la route de Randa. Zone de moyen altitude avec une population non négligeable qui pourrait héberger un village.

Kalaf : situé à près de 12 km à partir de Tadjourah-ville sur la cote en direction de Djibouti.

Roueli : l'axe Tadjourah – Obock est peu développé d'où nécessité d'appui aux communautés locales. Roueli situé à l'Est de Tadjourah-ville est un plateau traversé par la route asphaltée d'où faciliter de communication et d'acheminement des productions.

L'alimentation de la ville de Tadjourah et la protection de celle-ci par les crues d'eau des pluies constituent aussi des priorités.

Président du conseil regional

Il faut aussi tenir compte des programmes en cours tel que le PRODERMO et l'appui de la JICA. Pour ce faire il sera nécessaire de rencontrer les responsables de ces projets ou institutions.

Secrétaire general

Les critères pour la mise en place les PAP sont : disponibilité de l'eau pour l'irrigation (nappe profonde mobilisable), terres arables, bénéficiaires intéressés par la diversification des activités, etc....

Said Kaire :

Le forage d'Ad Bouya équipé en solaire a un débit de 10 m³/j. plus on se rapproche de la zone cotière plus l'eau est chargée en sel mais le nouveau de concentration des sels reste en deça de niveau de la nappe de Djibouti.

Prefet :

Equiper les forages en panneau solaire est une bonne chose. La non fourniture de batterie avec l'équipement solaire conditionne l'exhaure à l'ensoleillement. Et cela constitue un problème pour les zones où le ciel est régulièrement couvert de nuages surtout pendant la saison fraîche. Il faut si possible trouver des alternatives et tenir compte de cela dans les futurs programmes.

Il sera utile de prospecter et de diversifier les moyens d'exhaure notamment en réintroduisant par l'énergie éolienne au niveau des zones agricoles qui s'y prêtent.

Etant donné que la ville de Tadjourah ne peut plus se développer coté Ouest avec l'implantation du nouveau port de Tadjourah, il reste le coté Est juste après l'oued Marsaki où l'installation de la population est conditionnée par la disponibilité de l'eau et de l'électricité.

2. Visite de terrain

Suite aux entretiens, il a été procédé aux visites des sites indiqués.

- Site d'Afaloina : le diagnostic suivant a été fait :

En amont du campement du lieudit « Afaloina », un puits traditionnel situé dans le lit de l'oued alimente la population et leur bétail. Il y a les traces d'un petit jardin abandonné et une autre superficie restreinte clôturée.

Sur la rive droite de l'oued une petite terrasse alluvionnaire, traversée par deux bras (canalisant les eaux de ruissellement du versant) profond en aval, a été identifiée. Cette terrasse, sans parler de sa faible qualité de sol et les travaux de CES nécessaire à son aménagement, s'avère trop petite (0,5 ha) pour justifier un investissement envisagé. En remplacement de ce site, il a été proposé de prospecter un autre site, sur la plaine côtière en direction du Goubet, sur le plateau de Waïdedlé San.

- Site de As Hougouba (Kalaf)

Il est situé en amont de la route de l'unité entre l'oued Aiboli et le village de Kalaf. Ce plateau à une altitude de près de 200 m a un espace suffisant pour l'implantation d'un PAP. Il a une pente douce, un sol alluvionnaire et caillouteux. Il possède une végétation arborée à dominance *Caesalpinia erianthera* et *Rhigozum somalens*.

Il faudra procéder à une étude du sol pour en préciser la structure et la profondeur.

- Site d'Ad Bouya

Il est situé à près de 15 km de Tadjourah en direction d'Obock. Le plateau de Roueli est assez plat avec un sol gravionnaire avec du limon comme liant. Il est pourvu d'une végétation arbustive à forte densité (dominé par *Rhigozum somalens*, *Acacia Oerfota* et *Acacia mellifera*) le long du réseau hydrographique. Ce terrain peut accueillir un PAP à condition de trouver de l'eau d'irrigation.

- Site de Darkenlé

Ce site caillouteux avec une faible pente possède assez d'espace pour accueillir un nouveau PAP à condition de s'assurer d'une quantité d'eau suffisante pour l'irrigation.

- PAP du PK9 (Tadjourah)

Ce périmètre d'une superficie de près de 3,5 ha est donné à 14 ménages à raison d'1/4 ha. Il est alimenté par un forage équipé d'un moteur thermique. Le palmier dattier est la culture dominante, suivi des cultures fourragères. Le manguier et le goyavier sont aussi cultivés. La qualité de l'eau d'irrigation est bonne mais les exploitants se plaignent d'un déficit en eau depuis le démarrage de la construction de la route Tadjourah – Balho.

- Digue sur l'oued Marsaki

A l'embouchure de l'oued marsaki il y a une digue en terre de près de 2,5 km.

- Les oueds traversant la ville de Tadjourah : ils s'agit d'aménager des seuils en amont des oueds de Bodoli et de Solali.

3. Mangroves

Il est prévu d'essayer l'implantation des mangroves disparues de la plaine cotière de Tadjourah. Lors de notre visite de terrain sur la plage de kalaf, la présence de quelques pieds de mangrove (mis en place en 2004) en mauvais état à cause du broutage milite pour tenter cette expérience. De plus les résultats positifs de la régénération des mangroves sur la plaine d'Obock constitue aussi un facteur d'encouragement.

4. Diagnostic des exploitations traditionnelles

A Sagallou, il y a 17 exploitations actives sur un total de 51. Leur superficie varie de 500 à 300 m². Les cultures dominantes sont le palmier dattier et les cultures fourragères. Les arbres fourragers tels que le *Leucaena leucephala*, *Azadiracta indica*, Laurier du yemen, *Zizuphus sp.*

Aussi le maraichage est pratiqué à petite échelle : tomate, oignon, carotte, piment, aubergine et du melon. La moto pompe est utilisé pour l'exhaure de l'eau. Un moment quelques exploitants étaient équipés de pompe manuel ou à pédale. Ce système n'a duré faute d'entretien et pièces de rechange. Une ONG internationale Mer Rouge vendait des pompes à main au prix de 12000 Fdj l'unité.

Les activités agricoles sont pratiquées par des personnes ayant un revenu pour couvrir certains frais fixe comme la rémunération d'un salarié, l'approvisionnement en gasoil (20 l/mois). Ainsi il arrive qu'un exploitant dépense près de 200 000 Fdj par an pour ces frais.

Les exploitants sont confrontés à la non disponibilité des semences de qualité. Le président de la coopérative de Sagallou dispose de 4 vaches laitières et d'une vingtaine de petits ruminants en majorité des chèvres. Ces derniers utilisent les parcours naturels mais les

bovins sont alimentés uniquement avec du fourrage issu de l'exploitation et du son mélangé quelques fois aux grains de maïs. La stabulation forcée des bovins est due à l'absence des pluies de mousson sur une période de près de 5 ans. Les petits ruminants, surtout les animaux en lactation, sont aussi complétés lors de la faible disponibilité fourragère des parcours naturels.

La production laitière est faible : en moyenne 3 litres/j pour une vache et près de 0,6 l/j pour une chèvre. Ce lait est vendu à 200 Fdj/l en milieu rural mais est plus chère à Tadjourah-ville situé à 25 km.

Dans le village de Sagalou situé en bordure de mer, la pratique agricole est tournée vers la production fourragère pour alimenter bovins et petits ruminants. Le président de la coopérative de Sagalou estime que l'investissement dans la production des fourrages est plus économique que l'achat du lait en poudre importé.

Les exploitants sont aussi confrontés aux dégats causés par les nuisibles des cultures. En terme de maladies animales, la brucellose (zoonose) est endémique dans la région. D'autres maladies telles que la pneumonie, les paratuberculoses internes et externes sont signalées.

Sur la plaine côtière d'Ambabo à Sagalou il y a en tout 152 exploitations agricoles réparties en 4 coopératives (Ambabo, Kalaf, Sagalou et Dououlou). La superficie moyenne de ces exploitations est $\frac{1}{4}$ d'ha avec un maximum de 10 ha à Ambabo.

Près de 70% de ces exploitations sont fonctionnels. Le moyen d'exhaure reste toujours les moto pompe. Prochainement une exploitation de taille importante sera équipée en panneau solaire avec l'appui de la FAO.

La nappe phréatique de la zone côtière n'est très bonne en terme de qualité de l'eau mais sa quantité ne pose pas de problème. Les exploitants pour la plupart associent la production végétale à la production animale.

La production des dattes est de l'ordre de 75 kg/an/palmier vendu en moyenne à 250 Fd/kg. La pollinisation des dattiers est des fois assistée et se fait avec l'appui des techniciens de la DAF.

Les gouttes à gouttes sont fournies à 60 jardins mais à terme il y aura 100 bénéficiaires. Ces producteurs ont reçu une formation. Ce système nécessite un entretien régulier avec notamment de l'eau de javel. Lors de notre visite au PAP de PK9, le système d'irrigation au goutte à goutte en place ne disposait pas d'un réservoir en eau approprié placé en hauteur. Ceci pour permettre l'irrigation basse pression.

L'absence au chef lieu de la région d'un local de vente des productions agricoles.

Le sous directeur régional de développement rural a évoqué les dégats causés par les crues surtout de l'oued Aiboli notamment au niveau de certains puits agricoles.

La région de Tadjourah constitue un pôle de développement grâce aux infrastructures telles que la route Tadjourah – Balho, port de Tadjourah, chemin de fer Tadjourah – Ethiopie, le port de Goubet. De ce fait, les productions agricoles à condition de leur durabilité trouveront un marché.

L'expérience de l'élevage des poules initié en 2012 par le Ministère de la promotion de la femme, donne à apparemment des résultats positifs. En tout 7 ménages ont bénéficiés de cette activité à raison de 10 poules par bénéficiaire.

Le commerce du bois et charbon de bois se fait de façon intensif surtout au niveau de la plaine cotière de Tadjourah. Prévoir la promotion des technologies moins gourmande en energie (foyer amélioré, etc...).

5. Appuis sollicités

Les appuis sollicités sont : formation des producteurs, fourniture d'outillage agricole, lutte contres les ennemies des cultures avec disponibilité des produits efficace mais moins nocifs pour l'environnement, fourniture des semences de qualité, fourniture de moyen d'exhaure économique de l'eau d'irrigation, aménagement des systèmes d'irrigation (saguia cimenté), amélioré la fertilité des sols, maitrise des maladies animales notamment les zoonoses, aménagement des puits et bassins pour les exploitations traditionnelles, technique d'amélioration de la fertilité des sols.

Cost

PAP de 2 ha : aménagement de la clôture + réseau d'irrigation + réservoir de 100 m³ : 10,8 millions Fdj

Restauration des écosystèmes : périmètre de 2 ha : aménagement de clôture : 4 247 900 Fdj

Appendix 15: Mission report of the first National consultant, M. Said Kaireh

REPUBLIQUE DE DJIBOUTI
Unité-Egalité-Paix

MINISTÈRE DE L'HABITAT, DE L'URBANISME ET DE L'ENVIRONNEMENT

DIRECTION DE L'ENVIRONNEMENT

PROJET SUR LES ECOSYSTEMES FRAGILE DE HANLE ET TADJOURA
« Situation du secteur de l'eau »



Par
SAID KAIREH
Ingénieur hydrogéologue
Juillet- Août - 2013

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Introduction

La République de Djibouti se caractérise par la sévérité de ses conditions climatiques. Les températures sont élevées. La pluviométrie annuelle est faible (150 mm). A cela s'ajoute une grande irrégularité spatio-temporelle des précipitations. Bien que la moyenne de ces précipitations soit faible, tout événement pluviométrique dépassant 10mm provoque un ruissellement d'une grande proportion de l'eau qui se déverse en mer. Ces ruissellements en crues dévastatrices produisent au passage une dégradation constante de l'environnement sous forme d'érosion hydrique et parfois une inondation sans précédent comme celle du mois d'avril 2004 qui a affecté principalement la capitale du pays. Ces conditions climatiques particulières ont pour conséquence l'insuffisance des ressources en eau. Le pays ne dispose pratiquement pas de cours d'eau permanent et les rares oueds ne coulent que quelques jours dans l'année en période de crue. La mise en place d'une stratégie de gestion des ressources en eau du milieu rural passe par l'utilisation rationnelle des quantités disponibles et la sensibilisation de la population rurale de manière à préserver les ressources en eau disponibles.

Les populations nomades utilisent traditionnellement les nappes superficielles, sujet aux crues violentes. Et les sécheresses fréquentes et sévères de ces dernières années ont provoqué l'abandon de ces puits. La construction des ouvrages hydrauliques ruraux sécurisés avec de l'énergie renouvelable est donc un atout pour faciliter l'accès à l'eau des populations pour les besoins domestiques et agricoles. Ainsi le revenu des jeunes agriculteurs peut être amélioré par la disponibilité d'une eau (gratuite jusqu'à présent) pour l'ensemble des activités socioéconomiques. De plus à travers des programmes et projets de grande envergure la République de Djibouti s'oriente vers le développement de ses ressources hydrauliques renouvelables, notamment par la mobilisation des eaux de surface dans les principaux bassins versants en vue de pallier durablement les besoins en eau de la population et des activités économiques. Cependant la mise en place d'une gestion participative est une sécurité indispensable pour pérenniser les ouvrages hydrauliques menacés par la gratuité de l'eau.

Le sous-secteur de l'hydraulique.

La Politique de l'eau est du ressort du ministère de l'agriculture, de l'Élevage et de la Mer, Chargé des Ressources Hydrauliques (MAEM-RH). L'ONEAD (Office national des eaux et de l'assainissement de Djibouti) gère l'alimentation en eau du milieu urbain et la Direction de l'eau a la responsabilité de l'alimentation en eau potable des populations rurales et de leurs cheptels.

L'amélioration du sous- secteur hydraulique est une étape importante vers la sécurité alimentaire mais aussi vers la sédentarisation des populations nomades. Ainsi la stratégie sectorielle pour l'hydraulique a beaucoup évolué ces dernières années en république de Djibouti. De ce fait les principaux axes du Schéma Directeur National de l'eau, élaboré en 2000, ont presque tous été réalisés. Il s'agit en particulier :

De l'axe « Gestion rationnelle des ressources en eau »

Il y a eu à cet égard la création d'un service appui à la gestion décentralisée des points d'eau au MAEM-RH et une campagne de sensibilisation des populations rurales à la gestion rationnelle de l'eau dans les cinq régions de l'intérieur ; la création des Comités de Gestion (CG) des points d'eau est une réalité sur plusieurs sites.

De l'axe « Accroître la disponibilité de l'eau et son accès pour les populations pauvres »

On observe dans ce domaine i) la réalisation des 22 points d'eau ruraux (forages) équipés en système d'exhaure à partir de l'énergie solaire; ii) la réhabilitation des grandes retenues

du nord au nombre de cinq (5); iii) l'approvisionnement en eau des zones rurales (acquisition de 15 camions citernes de 15m³); et iv) la réhabilitation de 60 puits dans le cadre du projet de lutte contre la sécheresse et la mise en place de réservoirs d'eau pour l'urgence dans les zones difficiles d'accès.

de l'axe « Renforcement le cadre institutionnel »

A cet effet il y a eu i) la création du code de l'eau en 2000 ; ii) l'implication croissante des collectivités locales avec la création des comités de gestion et le renforcement des associations dans les zones rurales; et iii) la sensibilisation des populations sur les problèmes de l'eau et la tenue d'un atelier de réflexion sur la gestion participative des points d'eau (décembre 2006).

de l'axe « levée les contraintes institutionnelles »

A ce sujet a été organisé le premier forum des investissements privés, avec notamment un thème concernant le financement de développement de l'hydraulique par le secteur privé (décembre 2007).

de l'axe « promotion des moyens d'exhaure adaptés »

Améliorer la conception technique des ouvrages ; Acquisition des deux nouvelles foreuses et renforcement des capacités matériels et logistique ; Introduction des Pompes manuelles ; Equipements des points d'eau en Énergies renouvelables (solaire...),.... »

La République de Djibouti souffre cruellement du manque d'eau (pluviométrie annuelle 150 à 250 mm/an). Sa capitale Djibouti, les villes de l'intérieur du pays, ainsi que la plupart des villages de ruraux connaissent des difficultés pour leur approvisionnement en eau potable de qualité. C'est pourquoi la politique hydraulique à Djibouti a toujours donné la priorité à la lutte contre la soif, principale préoccupation du gouvernement et accorde une grande priorité à la bonne gestion et au développement des infrastructures hydrauliques de mobilisation des eaux pour satisfaire par ordre d'importance : (1) les besoins domestiques et essentiellement les besoins en eau potable, (2) les besoins du cheptel et (3) les besoins du secteur agricole et industriel. En outre, le schéma directeur prévoyait aussi des réformes institutionnelles qui ont déjà été mises en place.

1. Analyse du secteur de l'Hydraulique Rurale

a) Potentialités du sous-secteur de l'eau

En dépit des contraintes climatiques difficiles et notamment la faible pluviométrie (150 mm/an), le pays dispose des ressources en eau souterraines importantes dont environ 30 millions de mètre cube sont exploités annuellement. Afin de répondre aux besoins en eau de la population et des activités de développement dans le domaine de l'agro-élevage, plusieurs projets portant sur la création de nouveaux points d'eau sont en cours (forages et puits cimentés).

Par ailleurs, la stratégie du pays est axée de plus en plus sur la valorisation des eaux de surface dont la quantité potentiellement mobilisable est estimée à trois cent quarante cinq millions de m³/an (345 000 000 m³).

b) Problématique de l'hydraulique rurale

Le milieu rural a un besoin en eau d'environ 10 millions de mètres cubes dont la part de l'agriculture serait de 70% du besoin. (Schéma directeur de l'eau, villes de l'intérieur, 1999). De ce fait le secteur rural continue de souffrir de nombreuses insuffisances qui se présentent

en obstacle majeur au développement durable des ressources en eau (synthèse de la situation hydraulique, MAEM-RH, 2004). En ce qui concerne l'hydraulique rurale les principales contraintes sont d'une part l'absence de cours d'eau pérenne et la méconnaissance du potentiel des nappes et d'autre part le nombre des points d'eau qui reste insuffisant. Afin de réduire le manque d'eau des zones rurales le ministère a entrepris, avec l'appui des partenaires techniques, un programme de réflexion sur une gestion participative des points d'eau en impliquant de plus en plus les bénéficiaires. Car jusqu'à présent, l'exploitation, la gestion et la maintenance de l'ensemble des infrastructures d'Alimentation en Eau Potable (AEP) des zones rurales sont à la charge de l'état. Néanmoins les efforts fournis pour garantir l'approvisionnement sont compromis les plus souvent par l'absence en stock des équipements de pompage, par l'irrégularité des interventions préventives, par les difficultés de mobilisation de la brigade d'extraction et de l'installation des équipements d'exhaure et par la défaillance des matériels de sécurités (inventaires des ressources hydrauliques, MAEM-RH, UNICEF, 2006). De plus ces réalisations nécessitent une amélioration du Fonds de l'Eau¹¹¹ et une reconsidération du budget alloué pour la maintenance et le dépannage des forages et des points d'eau gérés par la direction de l'Eau. Les problèmes relatifs à l'accès à l'eau sont les suivants :

- (i) l'insuffisance des points d'eau aménagés dû à l'inexistence des pistes praticables rend difficiles l'accès à l'eau ;
- (ii) Localisation de la plupart des points d'eau dans des oueds. Ce qui rend l'eau inaccessible au passage de chaque crue rendant les populations vulnérables ;
- (iii) les pertes techniques et l'insuffisance des moyens des services concernés occasionnent une diminution de la quantité d'eau disponible ;
- (iv) la faiblesse de la capacité structure de gestion des points d'eau est aussi une cause de perte d'une quantité d'eau importante.
- (v) l'insuffisance des moyens logistiques des services techniques de la direction de l'eau et l'insuffisance des moyens technologiques freinent l'accès à l'eau des populations.

c) Agriculture irriguée

Les petits jardins d'oasis existants exploitent des puits peu profonds creusés dans le lit des oueds et qui sont détruits par la première crue. Les autres jardins des coopératives ou les périmètres agropastoraux dépendent entièrement de l'irrigation grâce des eaux souterraines. Les différents systèmes d'irrigation sont : la méthode gravitaire dans les zones où les sources sont abondantes, l'irrigation par aspersion et le système goutte à goutte dans les secteurs alimentés par les points d'eau fonctionnant en énergie solaire dont bénéficient tous les périmètres agropastorales de ces dernières années. Mais ces périmètres agricoles qui sont encore à leur stade expérimental sont confrontés à une arrivée massive de la population rurale qui fuit la sécheresse chronique qui sévit le pays ces dernières années. Ainsi une Sédentarisation mal maîtrisée entraîne une concentration autour des rares points d'eau modernes (forages équipés en panneau solaire ou avec une pompe manuelle). Cependant un encadrement immédiat et technique des nouveaux « cultivateurs » pourrait réduire le gaspillage et les pertes d'eau sur les réseaux d'irrigation.

II. Stratégies du secteur de l'eau

¹¹¹ (*) Le Fonds National de l'Eau a pour objet : de participer au financement de la politique nationale de l'eau en milieu rural, de participer à la politique sociale de l'eau au niveau de l'hydraulique rurale et urbaine, de participer au financement de l'entretien du réseau hydro-climatologique, mais aussi de servir de fonds de secours dans les situations d'urgence pour remettre en état les infrastructures d'alimentation en eau potable en milieu rural et urbain. (FNeau, 2001)

Le développement durable du secteur de l'eau est l'une des priorités du Gouvernement. De ce fait, une meilleure maîtrise des eaux de surfaces et souterraines nécessite la mise en œuvre des mesures déjà prises pour une bonne gestion et une planification du développement durable du secteur hydraulique. De plus la mise en œuvre de cette politique exige la disponibilité d'informations suffisantes et valables sur le cycle de l'eau et des phénomènes hydrologiques dans le pays.

Les axes stratégiques suivants :

- i) Maintien du rôle de l'Etat en matière de planification, de suivi et de coordination des actions de développement relatives à l'eau
- ii) Reconnaissance et mise en valeur des ressources en eaux souterraines et en eaux de surface ;
- iii) Evaluation des potentialités en eau et des technologies éprouvées pour leur exploitation ;
- (iv) Exploitation, gestion et protection des eaux souterraines et des eaux de surface ;
- (v) Participation et responsabilisation des usagers bénéficiaires à toutes les actions de développement et à l'utilisation des ressources en eau.

a) Dispositifs Institutionnels

En effet le Gouvernement a entrepris, depuis une vingtaine d'années des réformes institutionnelles qui sont :

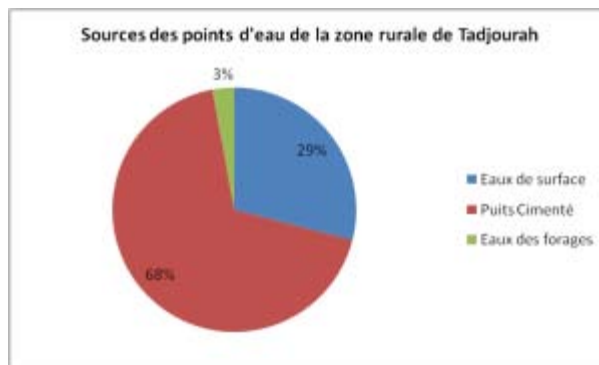
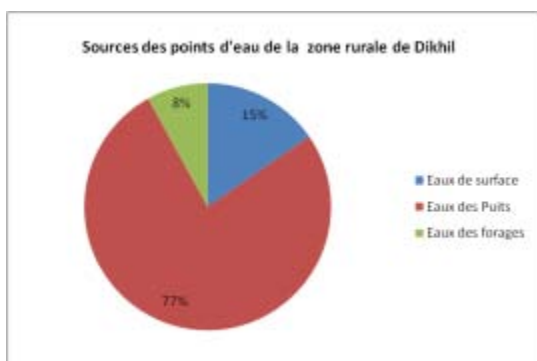
- Schéma Directeur de l'Eau,
- Création de la Direction de l'Eau
- Code de l'Eau,
- Commission Nationale des Ressources en Eau
- Secrétariat Technique de l'Eau
- Fonds National de l'Eau,
- Elaboration d'un plan d'assainissement individuel
- Création de la Direction des Grands Travaux
- Création d'un groupe Eau et Assainissement (Cluster WASH)

b) Les autres intervenants dans le secteur de l'eau

- Le Ministère de la Santé (Direction de l'épidémiologie et d'information sanitaire),
- Le Ministère de l'enseignement supérieur et de la Recherche (Centre d'étude et des recherches)
- Ministère des transports (La Direction de la météorologie nationale)
- Ministère de l'Agriculture, de l'Eau, de l'Elevage, de la Pêche et des Ressources Halieutiques,
- Ministère de la Promotion de la Femme (projet eau et agropastoral féminin)

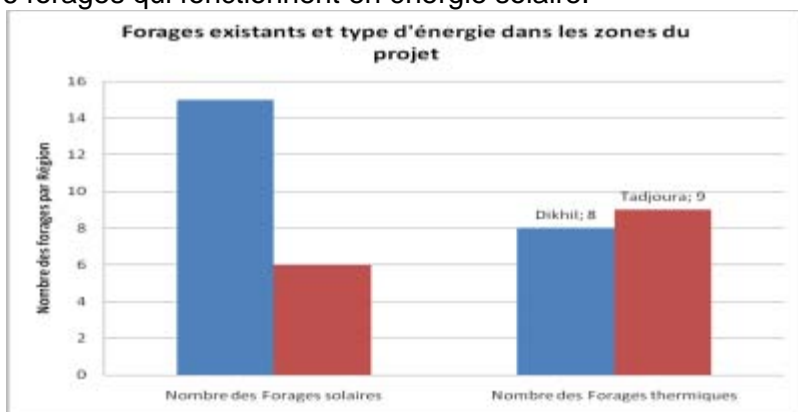
III. Mode d'approvisionnement en eau du milieu rural

Le milieu rural bénéficie de plus en plus de la réalisation de forages, financés sur fonds publics. Ainsi les populations d'origine nomade commencent à se sédentariser autour des forages. Les deux graphiques suivants représentent les catégories des points d'eau (puits, forages, eaux de surface (sources, citernes enterrées et retenues d'excavations)). Bien que les forages soient inférieurs en nombre, ils représentent les sources d'alimentation en eau potable pour les humains, les cheptels et l'agriculture.



IV. Les énergies renouvelables

Les forages ruraux fonctionnent ont une source d'énergie thermique ou photovoltaïque. Dans la région de Dikhil il ya 23 forages dont 15 forages sont équipés avec des panneaux. De même qu'il existe 15 forages dans la région de Tadjoura avec 6 forages qui fonctionnent en énergie solaire.



REGION	Forages solaires	Forages thermiques	Total
Dikhil	15	8	23
Tadjoura	6	9	15

Le tableau n°1 montre le type des points d'eau existants dans les zones du projet. Bien que les puits cimentés soient majoritaires (en nombre), ce sont les forages qui fournissent une grande partie d'eau de consommation ainsi que pour l'irrigation.

Région	Puits Cimenté	Puits Traditionnel	Source Retenue	Citerne	Micros Barrage	Forages ruraux
Dikhil	141	78	16	12	15	23
Tadjourah	166	165	33	27	80	15

Tableau n°1 : état actuel des ressources en eau des zones d'étude, MAEM-RH-Direction de l'eau, 2013

V. Sécurisation des points d'eau

Afin de sécuriser les points d'eau, des moyens d'exhaure adaptés sont utilisés pour contrer la hausse du prix des carburants. Les points d'eau sont équipés d'une pompe solaire. Certains points situés dans des zones à forte densité sont équipés d'un système hybride. Ce qui permet de faire face au manque d'eau et d'améliorer la situation de la population rurale en réduisant significativement la durée d'attente autour du point d'eau. A cela s'ajoute une formation des bénéficiaires au maintien de la station de pompage et à la sensibilisation de l'importance de l'hygiène autour du point d'eau.

VI. Suivi de la qualité de l'eau

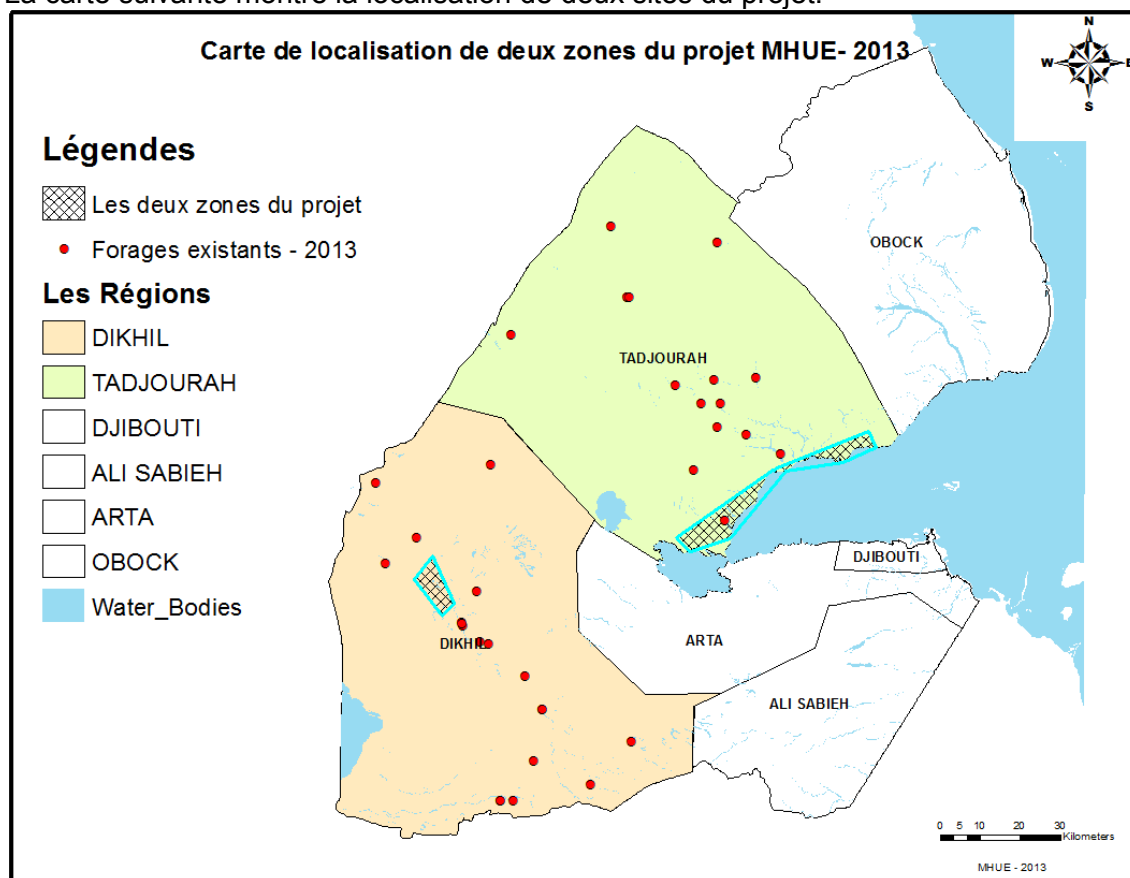
Les points d'eau des zones rurales ont fait l'objet d'analyses physico-chimiques approfondies en 2006 et des campagnes pilotes d'analyse bactériologique ont commencé depuis 2007 en collaboration avec la Direction d'épidémiologie et d'information sanitaire du Ministère de la Santé et le Laboratoire géochimique du CERD. Ces analyses ont été faites sur des puits, des sources communautaires et les réservoirs des villes de l'intérieur.

VII. Les zones du projet

Le projet intervient dans deux zones géographiques très différentes. La première zone se situe dans la localité de Hanleh de la Région de Dikhil. Cette zone située à l'intérieur du pays vit de l'Agriculture et de l'Élevage.

La deuxième zone du projet est située sur la côte de la Région de Tadjourah. Elle est en contact avec la Mer Rouge. La population vit par ordre d'importance de l'Élevage, de la pêche et de l'Élevage.

La carte suivante montre la localisation de deux sites du projet.

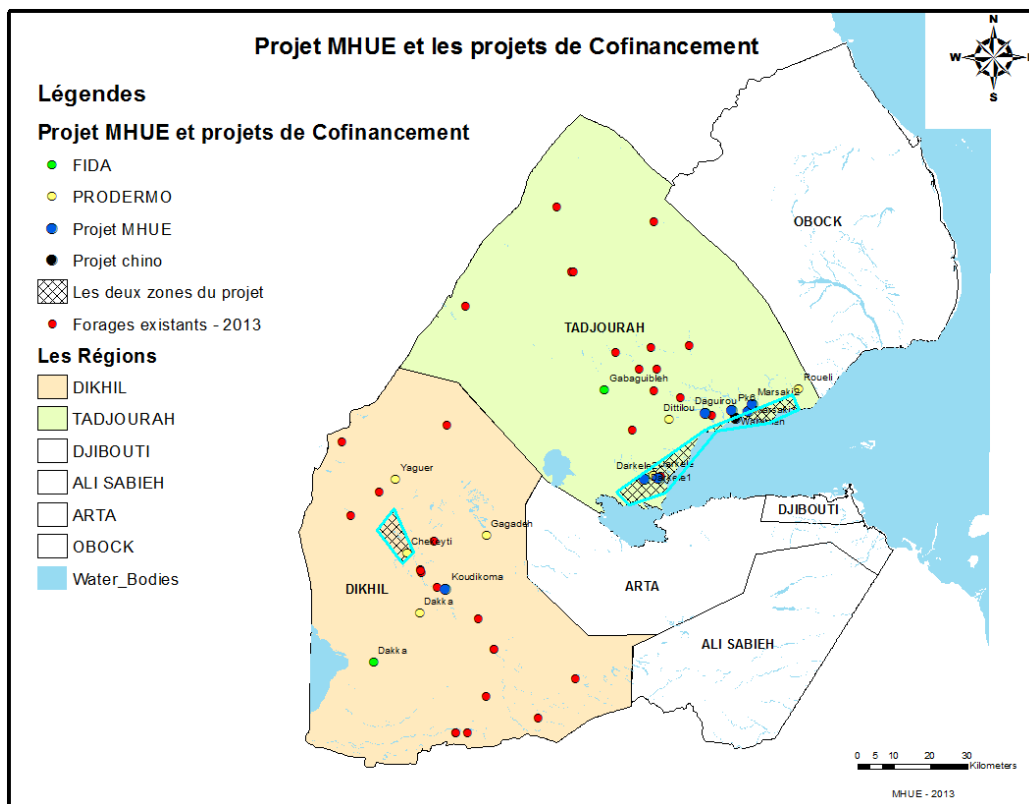


VIII. Complémentarité avec d'autres interventions

Ce projet est un complément aux projets/programmes suivants qui sont mentionnés dans les tableaux suivants :

Le Gouvernement a déjà lancé en 2007 une initiative majeure pour la mobilisation des eaux sous l'égide du Programme de Mobilisation des Eaux de Surface et de Gestion Durable des Terres (PROMES-GDT). Ce programme vient en réponse au "Problème de la Soif" qui affecte sévèrement la population rurale et pastorale pendant la saison sèche. Il est cofinancé par le FIDA, (principal bailleur), le PAM, le FEM et le FFEM et la Facilité Africaine de l'Eau (FAE) de la Banque Africaine de Développement (BAD). Respectant l'approche et les objectifs du PROMES-GDT d'autres bailleurs ont été mobilisés et interviennent dans ce

secteur. Il s'agit de la BM et de la BAD, respectivement à travers le Projet des Eaux d'Appui au Développement Rural et de mobilisation des Eaux et Appui a la mobilisation des eaux à usage domestique et agricole en milieu rural. L'agence de coopération Japonaise(JICA) ainsi que la Chine assiste le Ministère dans l'alimentation en eau potable des zones rurales.



IX. Protection contre les crues

Dans le cadre de ce projet, il est prévu de renforcer la protection de la ville de Tadjoura contre les crues des oueds Marsaki et Bodoli. Dans l'oued Marsaki, une digue en terre d'environ deux kilomètres existe déjà depuis une dizaine d'année. Le renforcement de ces digues consiste à réaliser des travaux de gabionnages sur le long bras des principaux oueds. Les seuils en gabions devraient permettre d'améliorer les parties en amont et de recharger les nappes.

Dans l'oued Marsaki, les travaux de gabionnage sont proposés dans six sites. La longueur totale estimative est de 1265 mètres. A cela s'ajoute un renforcement de la digue par des gabions doubles sur une longueur totale de 1800 mètres soit 3600 mètres.



Figure (XX) Sites des travaux de gabionnage dans l’oued Marsaki

Dans l’oued Bodoli, il est préconisé d’intervenir dans 5 sites (voir l’image suivante) de longueur totale estimative de 1100 mètres. Ces travaux ralentiront significativement la force de la crue partiellement. Il existe également une digue en terre de faible importance.



Figure (XX) Sites des travaux de gabionnage dans l’oued Bodoli

Il est également prévu de réaliser des travaux de gabions sur une longueur de 2000 mètres à Hanleh afin de protéger les jardins situés sur les berges des oueds.



Figure (XX) exemple de la taille de gabions à Marsaki
Les gabions ont une dimension standard de 1*1*2 soit 2m³.

X. Projets finis récemment 2007-2012

Titre du projet	Partenaire financier	Période	Budget total	Description
Etude des bassins versants	BID	2008-2010	US\$ 0.3 millions	Etude de faisabilité des BV Marsaki et Bihidlé /Etude APS-APD/ Aménagement des ouvrages de rétention sur les deux Bassins
Projet Fonds Saoudiens « alimentation en eau potable des zones rurales »	Fonds Saoudien	2005-2006	US\$ 3.8 millions	Réalisation de 21 forages pour l'alimentation en eau des zones rurales (phase1)
Projet Abu Dhabi « alimentation en eau potable des zones rurales »	Abu Dhabi	2010	US\$ 0.8 millions	Alimentation en eau potable des zones rurales, création de 5 forages profonds
Projet de lutte contre la soif	UE	2006-2009	2.06 millions d'euros	Programme de lutte contre la sécheresse : création des points d'eau, inventaire et réalisation d'une base de données sur les ressources en eau, renforcement du ministère
Projet PSSA : Composante maîtrise de l'eau	BID	2006-2009	US\$ 0.350 millions	Réhabilitation des puits traditionnels avec mise en place des panneaux solaires.
Projet IGAD « La cartographie, l'évaluation et la gestion des ressources d'eau transfrontières de la sous région IGAD »	IGAD	2009-2012	US\$ 2.5 millions	Projet de lutte contre la sécheresse
Programme d'urgence et de réhabilitation (OSRO/DJI/102/CHA)	FAO	2011	US\$ 0.4 millions	Améliorer les conditions de vie des communautés agropastorales qui vivent dans un état d'extrême pauvreté en promouvant une gestion des ressources naturelles : réhabilitation et créations d'ouvrages d'eau (puits, citernes, réservoirs)

XI. Programmes et Projets en cours d'exécutions

Titre du projet	Partenaire financier	Période	Budget total	Description
<p>PPIB : Profil de projet d'investissement bancable: Projet de développement de l'agriculture oasisienne – PDAO</p>	<p>FAO, NEPAD</p>	<p>2009-2014</p>	<p>US\$ 4 446 091</p>	<p>L'objectif global du projet est la lutte contre la pauvreté et l'exode rural. Les objectifs immédiats sont :</p> <ul style="list-style-type: none"> • amélioration et diversification de la production alimentaire; • augmentation des superficies cultivées; • meilleure maîtrise de l'utilisation de l'eau d'irrigation; • renforcement de l'encadrement et de la formation des techniciens et agriculteurs; • renforcement des capacités des coopératives. <p>Appui aux producteurs et renforcement des capacités des acteurs Extension des superficies Promotion de la culture du palmier dattier</p>
<p>Promouvoir des actions adaptées d'aménagement et de gestion des eaux de surfaces</p>	<p>PANA Ministère de l'Environnement</p>	<p>2012-2014</p>	<p>US\$ 1, 447,000</p>	<p>Amélioration de l'infiltration des eaux de ruissellement pour accroître la productivité des parcours et la recharge des nappes phréatiques pour réduire la vulnérabilité des zones cibles aux changements et variabilité climatiques.</p>
<p>Promotion des exploitations d'agro élevage intégré et de développement des techniques d'irrigation et d'exhaure pour lutter contre la salinité des terres</p>	<p>PANA Ministère de l'Environnement</p>	<p>2010-2014</p>	<p>US\$ 765,000</p>	<p>Amélioration des techniques agricoles, de l'association de l'agriculture/élevage et de la lutte contre la salinité des terres agricoles pour réduire la vulnérabilité dans le district de Dikhil, la plaine côtière de Tadjourah et le district d'Ali Sabieh aux changements et variabilité climatiques.</p>

Titre du projet	Partenaire financier	Période	Budget total	Description
Appui institutionnel pour la mise en oeuvre d'une politique sectorielle de l'eau.	9ème FED	2011-2013	2,8 millions Euros	- Assistance technique - Assistance matérielle (laboratoire, équipement informatique, matériels de mesures).
Projet d'Alimentation en eau potable des régions Sud de Djibouti	JAPAN	2010-2013	6 millions	Réalisation de 7 forages pastoraux à Hanleh Renforcement de la capacité du ministère
Projet d'Alimentation en eau potable des régions Nord de Djibouti	Chine	2012-2013	US\$ 1.58 millions	Réalisation des 5 forages équipés avec leurs infrastructures de surface à Tadjourah
Projet Mobilisation des Eaux de surface et de la gestion durable des terres (PROMES-GDT)	FIDA- FFEM-FEM- PNUD-PAM	2008-2015	12 millions	Protection de la forêt, construction des citernes enterrées, amélioration du parcours (mise en défens) Aménagement des surfaces, travaux de CES, Mobilisation des eaux de surface (construction des citernes)
Appui à la mobilisation des eaux de surface à usage domestique et agricole	FAE-BAD	2008-2012	2millions d'euros	Le projet de "mobilisation des eaux pour usage domestique et agricole en milieu rural" a pour objectif de (i) contribuer à la fourniture de services viables et durables d'approvisionnement en eau potable, d'irrigation et d'abreuvement du cheptel pour l'ensemble des populations rurales; (ii) permettre une meilleure connaissance des ressources en eau du pays et (iii) mettre à la disposition des autorités Djiboutiennes une banque de projets de mobilisation des eaux

Titre du projet	Partenaire financier	Période	Budget total	Description
Etude du schéma directeur pour l'irrigation et l'agriculture durable pour les zones Sud de Djibouti	JICA	2012-2014	USD 3 millions	Formuler un schéma directeur de l'agriculture irriguée dans les zones du projet afin d'améliorer les moyens de subsistance et d'éradiquer la pauvreté des familles nomades.
Projet de Développement Communautaire Rural et Mobilisation des Eaux (PRODERMO)	BM	2011-2016	9 millions	Augmenter l'accès des communautés rurales à l'eau et renforcer leur capacité de gestion des ressources hydrauliques et agropastorales dans les zones du projet
Projet d'aide d'urgence aux populations pastorales de Djibouti	FAO	2012-2013	1910	Réhabilitation des citernes, des puits, Création des retenues Renforcement des capacités du MAPE-RH (DHR)
Projet de renforcement de la sécurité alimentaire par l'accès à l'eau des populations nomades	FAO	2012-2012	2650	Alimentation en eau des populations rurales
Projet de protection du capital cheptel du milieu rural	FAO	2012-2012	2550	Santé animale et protection du cheptel dans les zones rurales
Projet d'appui à la protection de l'environnement	PAM	2012-2012	ND	Vivre contre travail pour la protection de l'environnement
Projet d'appui à la production agricole	PAM	2012-2012	ND	Vivre contre travail pour la production agricole
Projet de Potagers Communautaires	FAO	2013-2017	0.498	Assistance aux écoles des zones rurales par la mise en place des potagers agricoles
Projet d'augmentation de la production agricole des groupes les plus vulnérables	FAO	2012-2012	2650	Appui à la production agricole par la création d'activités génératrices des revenus

XII. Programmes et Projets en cours d'approbation

Intitulé du projet	Période	Source de financement	de (millions)	Description
Approvisionnement en eau potable et Assainissement en milieu rural	2012-2016	EU	5 millions d'euros	L'objectif du projet est de contribuer à l'amélioration durable des conditions de vie des populations rurales en vue de faciliter l'accès à l'eau.
Approvisionnement en eau potable et Assainissement en milieu rural	2012-2016	BAD	6.8 millions d'UC	Améliorer durablement les conditions de vie des populations rurales et des centres secondaires dans les régions de Tadjourah, d'Arta et d'Ali Sabieh.
Programme Régional de la Résilience à la sécheresse et de développement durable dans les pays de la Corne de l'Afrique	2013-2018	BAD	17 millions de dollars	Amélioration des conditions de vie de la population rurale et de leurs cheptels : création et réhabilitation des points d'eau
Projet de sécurisation des systèmes pastoraux à Djibouti	2013-2016	EU-FAO	6 millions d'euros	Gestion et valorisation durable des ressources naturelles et renforcement des capacités des services vétérinaires

XIII. Coûts indicatifs de la composante « Eau » du projet

a) Activité. Création des nouveaux forages profonds

Il s'agit de créer 6 forages d'exploitations à partir des 6 forages de reconnaissance dans la région de Tadjoura. Les différents travaux à exécuter sont décrits dans les tableaux de coûts

Désignation	Quantité	Prix unitaire (FD)	Prix total (FD)
- Etudes hydrogéologiques	1	35500000	35500000
-Forages de reconnaissance de 150 à 200 m	3	7 000 000	21000000
- Forages d'exploitation de 120 à 250 m	3	15 000 000	45000000
Total			101 500 000

b) Coût de l'équipement solaire

Le devis estimatif suivant donne le coût d'un équipement solaire pour l'équipement d'un forage profond de 200mètres de profondeur avec conduite de refoulement jusqu' au réservoir de stockage et aux bornes fontaines.

Ouvrages	U	Qte	P.U	Prix total (FD)
I- Réservoir de 300 m3 : Création d'un réservoir en moellon y compris fondation, élévation et dalle de couverture	M3	3	12 000 000	36000000
II- Conduite de Refoulement : Fourniture et pose de canalisation en tuyau PVC de Ø 63 y compris tranchée, pose de sable fin et remblayage	ml	2000	3500	5600000
III- Installation des équipements solaires : Fourniture et pose des équipements solaires avec création des infrastructures (longrine et grillage)	Fft	04	15000000	60000000
Total				101 600 000

c) Coûts du renforcement de la protection des berges

Le tableau suivant donne le budget estimatif pour l'activité dédiée à la protection des berges des oueds afin de protéger la ville de Tadjourah et les jardins de Hanleh.

PROTECTIONS DES BERGES DES OUEDS				Montant	
	Unité	Qté	Coût Unit	US \$	FD
Digues de Tadjourah					
Renforcement de la digue	m ³	3600	42.25	152 100	26 997 750
Seuils de gabions sur six sites à Marsaki	m3	1265	42.25	53 446	9 459 986
Seuils de gabions sur six sites à Bodoli	m3	1100	42.25	46 475	8 226 075
Mise en place des gabions	homme-mois	1500	10	15 000	2 655 000
Seuils de gabions sur six sites à Adbouyi	homme-mois	1000	42.25	42 250	7 478 250
Achat des gabions	Caissons	3000	84	252 000	44 604 000
Transport de pierres	Voyage	750	56	42 000	7 434 000
Transport de caissons	Voyage	10	1700	17 000	3 009 000
Zone Hanleh					
Seuils de gabions sur quatre sites à Hanleh	m3	2000	42.25	84 500	14 956 500
Mise en place des gabions	homme-mois	390	10	3 900	690 300
Achat des gabions	Caissons	1000	84	84 000	14 868 000
Transport de pierres	Voyage	250	56	14 000	2 478 000
Transport de caissons	Voyage	7	1700	11 900	2 106 300
Achat des ciments et transport	tonne	200	260	52 000	9 204 000
Remblais	Voyage	300	60	18 000	3 186 000
<i>Subtotal Correction et végétalisation des petites ravines</i>				736 471	130 355 411

XIV. BENEFICES ATTENDUS

De façon générale on peut considérer que les résultats seront

- la couverture des besoins en eau correspondant à l'accroissement des surfaces agricoles ou des autres activités génératrices de revenus indispensable pour assurer la sécurité alimentaire des populations rurales et réduire la pauvreté.
- l'approvisionnement en eau potable de la population rurale et urbaine en quantité et en qualité suffisante;
- l'amélioration de l'accessibilité des ressources fourragères disponibles et l'atténuation des effets de sécheresses sur le cheptel nomade;
- l'implication des collectivités locales et de la population rurale dans la gestion de l'eau et des différentes infrastructures.

De plus à la fin du projet, les résultats suivants seront

- l'amélioration de l'accès à l'eau et de la gestion des ressources en eau ;
- de meilleurs rendements agricoles (nouveaux hectares);
- l'amélioration de la sécurité alimentaire et de la lutte contre la pauvreté ;
- la fixation de nouvelles familles rurales ;

XV. RISQUES ET QUESTIONS EN SUSPENS

Le nombre de forages négatifs peut être élevé, ce qui réduirait la quantité d'eau mobilisable.

- L'appropriation des investissements par les populations bénéficiaires. Compte tenu des mauvaises expériences du passé, il sera nécessaire de prévoir des modalités précises de participation et d'appropriation des bénéficiaires. La sensibilisation des communautés engagée depuis quelques années est une bonne base à cet égard.
- Les principaux problèmes en suspens seraient
- Le financement des activités devra aussi être clarifié. Les principes de financement et de participation des bénéficiaires devront être définis avant le début de la mise en œuvre des activités du programme. Ils devraient être discutés par l'ensemble des acteurs pendant le Séminaire de démarrage du projet.
- Les études ou l'actualisation des études hydrologiques et pédologiques pour s'assurer que les ressources en eaux et en terres sont suffisantes, ne comportent pas de risques en soi, mais il faudra s'assurer de leur validité avant d'engager des aménagements.

XVI. LES ANNEXES

a) Annexe 1 : TDR du consultant

TERMES DE REFERENCE Du CONSULTANT National CHARGES DE PREPARER LE PROJET SUR LES ECOSYSTEMES FRAGILE DE HANLE ET TADJOURA

I- CONTEXTE

En tant que pays côtier aride, Djibouti est très vulnérable aux événements climatiques extrêmes. La principale cause de la vulnérabilité climatique dans le pays est la disponibilité de l'eau. Parce que Djibouti n'a pas de plans d'eau douce permanents, le pays dépend de l'eau souterraine et des flux saisonniers des oueds pour l'eau potable et l'agriculture. Les investissements dans les infrastructures de l'eau tels que les forages, bassins de rétention,

des barrages ou des étangs artificiels sont coûteux et leur planification est donc soumise à un examen attentif.

Djibouti est susceptible de subir d'importantes transformations dues au changement climatique et les changements qui en résultent dans les régimes de précipitations, les températures, et l'intensification d'événements extrêmes tels que les sécheresses. L'élévation du niveau de la mer est également susceptible d'avoir un impact significatif sur les ressources côtières, les moyens de subsistance et des écosystèmes. La grande majorité de la population est très vulnérable à la variabilité du climat en raison de leur dépendance à l'égard des ressources naturelles disponibles, rares ou extrêmes. Et la variabilité climatique dans le pays sont susceptibles d'influer sur l'équilibre écologique déjà fragile qui constitue une base pour les moyens de subsistance en milieu rural.

Une fiche d'identification de projet (FIP) a été conçue et un projet de taille complète (FSP) a été approuvé pour remédier à la vulnérabilité des écosystèmes fragiles des plaines centrales de Djibouti, en particulier les activités prioritaires définies dans le Programme national d'adaptation de Djibouti d'action (NAPA) pour renforcer la résilience dans les zones côtières les plus vulnérables à Djibouti », approuvé en 2010). Le projet porte également sur les lacunes de la capacité d'adaptation qui n'ont pas été abordés en raison du manque de fonds disponibles.

Les activités à entreprendre au titre de ce projet sont conçues pour profiter Djibouti en s'attaquant aux causes profondes de la vulnérabilité des écosystèmes fragiles dans ses plaines centrales aux impacts du changement climatique. En raison de la vulnérabilité des communautés, des écosystèmes et des infrastructures sera réduite, et la capacité institutionnelle pour étudier la variabilité du climat et au changement climatique sera encore renforcée. Une subvention PPG a été approuvée par le FEM pour Djibouti afin d'aider le pays à concevoir une proposition de projet de taille complète qui comprendra les éléments suivants:

Composante 1: Protection contre les dangers liés à l'eau au changement climatique, dans le but de réduire ou d'éviter les impacts négatifs des sécheresses et des inondations.

Composante 2: réhabilitation des écosystèmes, la récupération et la résilience, qui vise à rendre les écosystèmes fragiles plus productive et résiliente au changement climatique.

Composante 3: Moyens d'existence durables et résistants, qui vise à permettre aux moyens de subsistance de contribuer au maintien des services écosystémiques, ainsi que l'élimination des obstacles à la résilience.

Composante 4: La capacité institutionnelle, qui vise à accroître la capacité des institutions et des communautés à s'adapter de manière proactive aux changements climatiques.

La phase PPG va développer un raisonnement clair sur la sélection des sites pilotes dans les deux régions spécifiées dans le PIF (Tadjourah et Hanle), basé sur des critères convenus avec les parties prenantes. Les critères de sélection du site peuvent inclure des caractéristiques écologiques, la représentativité climatiques, les considérations socio-économiques ainsi que d'autres critères techniques.

C'est dans ce contexte que le Ministère en charge de l'Environnement souhaite obtenir les services des consultants nationaux dans les régions Tadjourah et de Hanle.

II- Description des tâches du consultant

Les tâches attendues du consultant hydrogéologue sont les suivantes :

- Décrire la problématique de l'eau dans les régions de Tadjoura et Hanlé dans le contexte du changement climatique
- Evaluer les risques des inondations dans les régions de Tadjoura et Hanlé
- Indiquer les ouvrages de protection contre les inondations dans les régions de Tadjoura et Hanleh (le nombre des digues et des micro-barrages, leur emplacement, leur hauteur, leur coût...etc)
- Indiquer le volume d'eau que doit supporter ces digues et micro-barrages
- Indiquer le nombre de forage avec panneaux solaires à réaliser, leur localisation, leur réservoir, leur canalisation, leur coût
- Recenser le nombre de projet en cours ou prévus dans les régions de Tadjoura et Hanlé

III- Résultats attendus

un Rapport détaillé des activités et des couts estimatifs des actions.

IV- Durée de la consultation : 2 mois

V- Profil des consultants

Un ingénieur agro- pastorale sera recruté pour réaliser ce travail en qualité de consultant national.

Le consultant doit avoir le profil suivant :

- Diplôme universitaire en hydrogéologie et en géologie (au moins une maîtrise) ;
- Connaissance approfondie de la maitrise de l'eau
- Expériences avérées dans les domaines ci-haut mentionnées

Annexe2 : Compte rendu de mission dans le secteur de Hanlé Du 1 au 2 aout 2013, Région de Dikhil

Compte rendu de mission dans le secteur de Hanlé Du 1 au 2 aout 2013, Région de Dikhil

L'équipe de la mission était composée de :

- M. Houssein Rirache : Directeur de l'environnement
- M. Said Kaireh : consultant national en gestion des ressources en eau
- M. Abdallah Barkat : consultant national en agriculture et élevage

L'équipe a rencontré à Dikhil le préfet de la région, M. Mohamed Cheiko et Dikhil adjoint M. Youssouf.

Ensuite des entretiens ont lieu avec successivement les exploitants du périmètre agropastoral (PAP) de Koudi Koma, ceux du PAP de Liliya bouri et enfin avec les producteurs des exploitations traditionnelles et les éleveurs traditionnels.

1. Koudi Koma

Les producteurs, au nombre de 32 sur une superficie totale de 8 ha, essaient tant bien que mal de maintenir en vie le palmier dattier in vitro. Au démarrage du PAP chacun des exploitants a bénéficié de 25 palmiers dattiers. Depuis 3 ans à cause du déficit en eau d'irrigation dû à un manque de carburant, le nombre de palmier dattier par exploitant varie

de 5 à 15 pieds. A cause de l'insuffisance d'eau d'irrigation ils ne peuvent pratiquer les autres cultures telles que fourragères, maraichères, arboriculture fruitière. D'où la nécessité d'un forage propre au PAP.

Il y a 2 forages à Kouidi Koma. Le premier forage avec un bon débit (voir volet eau) est destiné à la population et de leur bétail. Près de 140 ménages s'approvisionnent en eau à ce forage de Kouidi Koma. Le second forage plus récent équipé de panneaux solaires alimente le PAP. Cependant son débit est insignifiant, près de 10 m³/j, comparativement au besoin d'un PAP de 8 ha.

De ce fait, les 32 exploitants cotisent entre eux pour acheter du gasoil, à raison de 30 000 Fd/mois, pour maintenir en vie leur palmier dattier. Pour cela il utilise le forage équipé d'un groupe électrogène qui a un bon débit mais destiné à l'alimentation humaine et animale.

Les participants, au nombre d'une dizaine, mentionnent le besoin des éleveurs transhumants en citernes enterrées destinées à la consommation humaine au nombre dans le secteur d'Asbahari, Daada et afo af.

Volet Genre

Concernant les activités génératrices de revenu relatives au genre, les femmes, en plus des besoins de leur ménage, pratiquent de l'artisanat à base des feuilles de palmier doum (*Hyphaena thebaica*) pour la vente des produits auprès des grossistes qui viennent jusqu'au village pour les acheter.

Pour ce qui est des parcours naturels, les mises en défens sont possibles sur les sites suivants : Asbahari où on trouve Amanto, Bili, Danouni et Darmaito. L'ainé des participants indique que la question de mise en défens devra être traitée avec les 2 okals généraux : M. Med Ali entre Kontali et Garabayis et M. Ali Barouli pour ce qui de Hanleh et Yoboki.

Elevage

Les participants ont évoqué les difficultés rencontrées avec les Hyènes qui attaquent les chameaux et autres animaux domestiques en ces temps de sécheresse. Ils souhaiteraient qu'un moyen efficace soit mis en oeuvre pour éloigner ces animaux sauvages des proximités des campements.

Récapitulatif des besoins

- Améliorer l'accessibilité de l'eau d'irrigation (nouveau forage équipé de panneau solaire) ou dotation en carburant pour une année.
- Couvrir le réservoir d'eau de l'exploitation pour éviter le passage des éléments fins ou organiques dans le réseau d'irrigation. Le volume extérieur du réservoir est de 12 m x 12 m x 2,5 m soit un volume de 360m³.
- Remplacement des cornières supportant la clôture grillagée du PAP
- Former les agro-éleveurs aux bonnes pratiques en agro-d'élevage pouvant contribuer à améliorer leur rendement
- Contribuer à sécuriser la santé animale
- Contribuer à l'accroissement du disponible fourrager des parcours (travaux de CES, mise en repos, re-semis et régénération assisté d'arbres et arbustes)
- Diversification : aviculture familiale

2. Liliya bouri

Le PAP de Liliya Bouri a une superficie totale de 10 ha répartie à 42 exploitants. Il doit être irrigué à partir du forage. A ce jour, le groupe électrogène alimentant le forage est en panne, le réseau d'irrigation est bouché à certains endroits selon les participants. Aussi, étant donné que le réservoir d'eau est resté sans eau pendant un certains temps (3 ans), il présente des fuites.

Au PAP de Liliya Bouri, chacun des exploitants ont bénéficié de 35 plants de palmier dattier in vitro. Aujourd'hui faute d'irrigation près de la moitié de l'ensemble de ces palmiers dattiers sont sénescents et nécessitent un sauvetage d'urgence.

Au début le palmier doum constituait le brise vent et les cultures suivantes étaient pratiquées : fourrages, les melons, pastèques, tomates.

Récapitulatif des besoins PAP de Liliya Bouri

- Réhabiliter le réservoir d'eau d'irrigation. Volume du bassin : 2,90 m x 10 m x 9,5 m soit près de 280 m³ d'eau.
- Equiper le forage en moyen d'exhaure à moindre coût (énergie solaire)
- Diversification : aviculture
- Formation en agro-élevage

3. Exploitations agricoles traditionnelles

Il y a près de 200 exploitations mais seulement un nombre de 80 sont en activités en ce moment. Parmi les exploitations en activités 10 possèdent les puits et bassins aménagés. Les réseaux d'irrigation de l'ensemble des exploitations sont constitués de sagaia.

La coopérative agricole de Hanlé met aussi l'accent sur le problème logistique pour acheminer les productions sur le marché de la Capitale. Aussi l'absence d'une structure de micro crédit prêtant aux agro-éleveurs est mentionnée. Les membres actifs de la coopérative cotisent une somme de 500 Fd par mois par exploitants.

Il est indiqué aussi que la plupart des exploitants travaillent eux même la terre mais une minorité ayant les moyens font appel à des salariés en provenance de l'Ethiopie. Certains exploitants indiquent leur souhait d'expérimenter les cultures maraichères sous abri afin de baisser la température au niveau des parcelles et le système d'irrigation aux gouttes à gouttes.

Les productions des exploitations traditionnelles classées par ordre d'importance sont: fourrages, oignon, tomate, melon. A titre indicatif 200 caisses de 18 kg chacune et un camion de près de 4 m³ de fourrages sont commercialisées tous les 3 mois.

Les arbres fruitiers sont peu développés mais certains souhaitent notamment la culture du goyavier et du citronnier après bien sur formation des producteurs et fournitures des plants adaptés.

Lors de nos entretiens l'option d'alimenter en eau d'irrigation ensemble un groupe de jardin (4 à 6) selon la capacité du puits a été discutée. Les productions n'ont pas d'objection à cela à condition de couvrir les besoins en eau du groupe.

Les ennemies des cultures sont citées parmi les principales contraintes entravant le développement des cultures maraichères et fruitières.

Avant une ONG internationale basée à Hanlé avait un atelier de mécanique et fournissait les prestations suivantes:

- réparation des moto pompes
- fourniture de moto pompe de secours
- vente de pièces détachées pour moto pompe
- vente de pompes à pédale importées

Récapitulatif des besoins des exploitations agricoles traditionnelles

- Protection des berges en gabions au niveau de 3 sites: Issih Wehé, Tewao et Dawano.
- Aménagement des puits et bassins
- Equipement en moyen d'exhaure à énergie renouvelable
- Formation des agro-éleveurs aux différentes techniques culturales et d'association de la production animale
- Introduction des méthodes de lutte intégrée contre les ennemies des cultures
- Intrants vétérinaires pour soigner les animaux domestiques
- Introduction de l'agriculture sous abri
- Développement de l'irrigation aux gouttes à gouttes

Parcours et élevage pastoral

Les sédentaires possèdent un effectif réduit de chèvre en moyenne 5 têtes. Alors que les transhumants possèdent en moyenne près de 50 têtes de petits ruminants.

Il a été affirmé que beaucoup de ménages complètent leur revenu avec la vente de charbon de bois à base essentiellement du prosopis.

La décision de mise en défens de certains sites d'intérêt pastoral nécessite une concertation entre les usagers en présence des responsables coutumiers. Et les participants sont favorables à cela et ont indiqué quelques sites potentiels suivants: Dawano, Rareyta et Guinibad. Toujours dans le domaine pastoral, les sites d'intérêt pour les travaux de conservation des eaux et des sols sont: Dadolé, Gohani, Rareyta, Sarouli af et Dalaha Malo.

4. Projets intervenants dans la zone

Projets d'aides d'urgence de la FAO

La FAO a fourni des ruches avec le matériel et équipement nécessaire. Lors de notre visite quelques colonies ont été visitées mais pour l'instant il n'y a pas eu de récolte. De plus dans le cadre des petits programmes d'urgence, la FAO a aussi fourni à la coopérative de Hanié:

- un moulin pour moulin les gousses de prosopis (arbustes envahissants)
- un matériel pour la fabrication de charbon de bois toujours à partir du prosopis.

Certains jardins bénéficient d'un appui ponctuel en outillage agricole. Aussi la FAO a démarré la phase d'expérimentation et promotion de l'irrigation aux gouttes à gouttes et la mise en place des panneaux solaires pour l'irrigation à petite échelle à Tewao.

**Compte rendu de mission dans la plaine cotière de Tadjourah
du 21 au 23 aout 2013**

Equipe de la mission:

- M. Abdoulmalik: préfet de Tadjourah
- Dini Abdallah Omar: Secrétaire général du MHUEAT
- Hassan Houssein: président du conseil régional de Tadjourah
- M. Abdallah Bourhan: sous directeur régional de développement rural
- M. Moussa Mohamed Abdallah: chef de secteur de l'élevage
- Said Kaireh: consultant national
- Abdallah Barkat: consultant national

Secrétaire général

le programme comprend les composantes suivantes:

- Aménagement de la digue de protection de la ville de Tadjourah surtout au niveau de l'oued Marsaki (renforcement de la digue à l'embouchure, réalisation des seuils en gabion ou pierres maçonnées en amont).
- Réalisation de forages destinés aussi bien à l'alimentation en eau des populations que pour l'irrigation des Périmètres Agro-Pastoraux (PAP).
- Aménagement des nouveaux PAP dans les différents sites caractéristiques.

Lors de notre précédente visite, il avait été question de 6 forages. Il serait bon de voir ensemble la répartition de ces 6 forages entre les PAP et l'alimentation humaine.

Préfet

l'ONG SOS sahel, Coopération Japonaise ont été évoqués comme intervenants dans la région. La JICA souhaite conduire une expérimentation en matière d'agriculture.

Concernant les PAP, les sites suivants ont été suggérés à condition de trouver l'eau et l'espace appropriés: Kalaf, Afaloïna et Roueli (εad Bouya).

Ce projet de changement climatique concerne la zone cotière dont il faudra indiquer la largeur.

Compte des besoins des populations et la nécessité d'intervenir sur une partie des bassins versants une bande de 10 à 15 km est préconisée pour l'implantation des activités du projet.

Afaloïna: situé à 15 km en amont sur la route de Randa. Zone de moyen altitude avec une population non négligeable qui pourrait hebergée un village.

Kalaf: le village de Kalaf ne possède pas un forage.

Roueli: l'axe Tadjourah – Obock est peu développé d'où nécessité d'appui aux communautés locales. Roueli est un plateau traversé par la route asphaltée d'où faciliter de communication et d'acheminement des productions.

Président du conseil régional

Il faut aussi tenir compte des programmes en cours tel que le PRODERMO et l'appui de la JICA. Pour ce faire il sera nécessaire de rencontrer les responsables de ces projets ou institutions.

Secrétaire general

Les critères pour les PAP: disponibilité de l'eau pour l'irrigation (nappe profonde mobilisable), terres arables, bénéficiaires intéressés par la diversification des activités, etc....

Said Kaire:

Le forage d'Ad Bouya équipé en solaire a un debit de 10 m³/j

Prefet:

Equiper les forages en panneau solaire est une bonne chose. La non fourniture de batterie avec l'équipement solaire conditionne l'exhaure à l'ensoleillement. Et cela constitue un problème pour les zones où le ciel est régulièrement couvert de nuages surtout pendant la saison fraiche. Il faut si possible trouver des alternatives et tenir compte de cela dans les futurs programmes.

Visite de terrain

- Site d'Afaloina : le diagnostic suivant a été fait :

En amont du campement du lieudit un puits traditionnel situé dans le lit de l'oued alimente la population et leur bétail. Il y a les traces d'un petit jardin abandonné et une autre superficie restreinte clôturée.

Sur la rive droite de l'oued une petite terrasse alluvionnaire, traversée par deux bras (canalisant les eaux de ruissellement du versant) profond en aval, a été identifiée. Cette terrasse, hormis sa faible qualité de sol et les travaux de CES nécessaire à son aménagement, s'avère trop petite (0,5 ha) pour justifier un investissement.

- Site de As Hougouba

Il est situé en amont de la route de l'unité entre le village de Kalaf et l'oued Aiboli. Ce plateau à une altitude de près de 200 m a un espace suffisant avec une pente douce et un sol alluvionnaire et caillouteux. Il possède une végétation arborée à dominance *Caesalpinia erianthera* et *Rhigozum somalens*.

Il faudra procéder à une étude du sol pour en préciser la structure et la profondeur.

- Site d'Ad Bouya

Il est situé à près de 15 km de Tadjourah en direction d'Obock.

pour accueillir un PAP

Diagnostic des exploitations de Sagallou

Il y a 17 exploitations actives sur un total de 51. Leur superficie varie de 500 à 300 m². Les cultures dominantes sont le palmier dattier et les cultures fourragères. Les arbres fourragers tels que le *Leucaena*, *Azadiracta indica*, Laurier du yemen, *Zizuphus*.

Aussi le maraichage est pratiqué à petite échelle: tomate, oignon, carotte, piment, aubergine et du melon. La moto pompe est utilisée pour l'exhaure de l'eau. Un moment quelques exploitants étaient équipés de pompe manuel ou à pédale. Ce système n'a duré faute d'entretien et pièces de rechange. Une ONG internationale Mer Rouge vendait des pompes à main au prix de 12000 Fd l'unité. Ces pompes avaient un débit approximatif de m³/h ????.

Les activités agricoles sont pratiquées par des personnes ayant un revenu pour couvrir certains frais fixe comme la rémunération d'un salarié, l'approvisionnement en gasoil (20 l/mois). Ainsi il arrive qu'un exploitant dépense près de 200 000 Fdj par an pour ces frais.

Les exploitants sont confrontés à la non disponibilité des semences de qualité. Le président de la coopérative dispose de 4 vaches laitières et d'une vingtaine de petits ruminants en majorité des chèvres. Ces derniers utilisent les parcours naturels mais les bovins sont alimentés avec du fourrage issu de l'exploitation et du son mélangé qq fois au grains de maïs. Cette situation est due à l'absence des pluies de mousson sur une période de près de 5 ans. Les petits ruminants sont aussi complétés lors de la faible disponibilité fourragère des parcours naturels.

La production laitière est faible : en moyenne 3 litres/j pour une vache et près de 0,6 l/j pour une chèvre. Ce lait est vendu à 200 Fdj/l au village de Sagalou mais est plus chère à Tadjourah-ville se trouvant à 25 km.

Dans le village de Sagalou situé en bordure de mer, la pratique agricole est tournée vers la production fourragère pour alimenter bovins et petits ruminants. Le président de la coopérative de Sagalou estime que l'investissement dans le fourrage est plus économique que l'achat du lait en poudre importé.

Les exploitants sont aussi confrontés aux dégâts causés par les nuisibles des cultures. En terme de maladies animales, la brucellose (zoonose) est endémique dans la région. D'autres maladies telles que la pneumonie, les paratuberculoses internes et externes sont signalées.

Les appuis sollicités sont : formation des producteurs, outillage agricole, lutte contre les ennemis des cultures avec disponibilité des produits efficaces mais moins nocifs pour l'environnement, fourniture des semences de qualité, moyen d'exhaure économique, aménagement des systèmes d'irrigation (saguia cimenté), améliorer la fertilité des sols, maîtrise des maladies animales notamment les zoonoses, aménagement des puits et bassins.

Problème de fertilité des sols.

L'expérience de l'élevage des poules initié par le Ministère de la promotion de la femme, donne à apparemment des résultats positifs. En tout 7 bénéficiaires à raison de 10 poules par bénéficiaire.

Le commerce du bois et charbon de bois se fait de façon intensive surtout au niveau de la plaine côtière de Tadjourah. Prévoir la promotion des technologies moins gourmandes en énergie (foyer amélioré, etc...).

Entretien avec le sous directeur de développement rural de Tadjourah

Sur la plaine cotière d'Ambabo à Sagalou il y a en tout 152 exploitations agricoles réparties en 4 coopératives (Ambabo, Kalaf, Sagalou et Douloul). La superficie moyenne de ces exploitations est $\frac{1}{4}$ d'ha avec un maximum de 10 ha à Ambabo.

Près de 70% de ces exploitations sont fonctionnels. Le moyen d'exhaure reste toujours les moto pompe. Une exploitation de taille importante sera équipée en panneau solaire avec l'appui de la FAO.

La nappe phréatique de la zone cotière n'est très bonne en terme de qualité de l'eau mais sa quantité ne pose pas de problème. Les exploitants pour la plupart associent la production végétale à la production animale.

La production des dattes est de l'ordre de 75 kg/an/palmier vendu en moyenne à 250 Fd/kg. La pollinisation des dattiers est des fois assistée et se fait avec l'appui des techniciens de la DAF.

Les gouttes à gouttes sont fournies à 60 jardins mais à terme il y aura 100 bénéficiaires. Ces producteurs ont reçu une formation. Ce système nécessite un entretien régulier avec notamment de l'eau de javel.

L'absence au chef lieu de la région d'un local de vente des productions est signalé.

A cause des crues surtout de l'oued Aiboli certains puits sont remplis de vase.

La région constitue un pôle de développement grâce aux infrastructures telles que la route Tadjourah – Balho, port de Tadjourah, chemin de fer Tadjourah – Ethiopie, le port de Goubet.

Le PAP du PK9 (Tadjourah)

Ce périmètre d'une superficie de près de 3,5 ha est donné à 14 ménages à raison d' $\frac{1}{4}$ ha. Il est alimenté par un forage équipé d'un moteur thermique. Le palmier dattier est la culture dominante, suivi des cultures fourragères. Le manguier et le goyavier sont aussi cultivés.

La qualité de l'eau d'irrigation est bonne mais les exploitants se plaignent d'un déficit en eau depuis le démarrage de la construction de la route Tadjourah – Balho.

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Appendix 16: Environmental and Social Safeguards Checklist

As part of the GEF's evolving Fiduciary Standards, implementing agencies have to address "Environmental and Social Safeguards". The checklist was developed with the following steps as guidance:

- STEP 1: Initially assess E&S Safeguards as part of PIF development. The checklist is to be submitted for the PRC.
- STEP 2: Checklist is reviewed during the PPG phase and updated as required.
- STEP 3: Final checklist submitted for PRC showing which activities are being undertaken to address issues identified.

Project Title	Implementing adaptation technologies in fragile ecosystems of Djibouti's Central Plains		
GEF project ID and UNEP ID/IMIS Number	GEF Agency Project ID: UNEP ID: 891	Version of checklist	One
Project status (preparation, implementation, MTE/MTR, TE)	Preparation	Date of this version	September 2013
Checklist prepared by (Name, Title, and Institution)	Ermira Fida, Head, GEF Adaptation Unit, DEPI		

In completing the checklist both short- and long-term impact will be considered.

Section A: Project location:

If negative impact is identified or anticipated the Comment/Explanation field needs to include: Project stage for addressing the issue; Responsibility for addressing the issue; Budget implications, and other comments.

	Yes/No/N.A.	Comment/explanation
- Is the project area in or close to -		
- a densely populated area	No	Most of the project interventions will be undertaken in rural areas which are not densely populated. Some interventions, however, will occur close to Tadjourah Ville. The specific focus of the activities occurring close to Tadjourah Ville are to improve the resilience of local communities to climate change. No negative environmental or social impacts associated with proximity to Tadjourah Ville are anticipated during project implementation. Monitoring and evaluation will be undertaken during the standard M&E periods.
- a cultural heritage site	No	
- a protected area	No	
- a wetland	No	
- mangroves	Yes	There are no mangroves in the project sites at present. However, the project will pilot the re-establishment of mangrove forest at a historical mangrovesite, Kalaf, in Tadjourah.
- an estuarine zone	No	
- a buffer zone of a protected area	No	
- a special area for protection of biodiversity	No	
- Will the project require temporary or permanent support facilities?	No	
<i>If the project is anticipated to affect any of the above areas an Environmental Survey will be needed to determine if the project is in conflict with the protection of the area or if it will cause significant disturbance to the area.</i>		

Section B: Environmental impacts

If negative impact is identified or anticipated the Comment/Explanation field needs to include: Project stage for addressing the issue; Responsibility for addressing the issue; Budget implications, and other comments.

	Yes/No/N.A.	Comment/explanation
- Are ecosystems related to the project fragile or degraded?	Yes	The central plains ecosystems are considered fragile and as such are targeted for rehabilitation and resilience–building, both on the coast and inland.
- Will the project cause any loss of important and/or fragile ecosystems or ecological and economic functions due to construction of infrastructure?	No	Substantial construction of infrastructure will take place in the project (levees and gabion walls). This infrastructure will not negatively affect any fragile or important ecosystems. Instead, it will protect the ecological functioning of degraded ecosystems by reducing erosion and desertification. Consequently, no mitigation measures are required because no negative effects are anticipated.
- Will the project cause impairment of ecological opportunities?	No	The project seeks to increase ecological opportunities.
- Will the project cause any increase in peak and flood flows? (including from temporary or permanent waste waters)	No	The project seeks to reduce flooding risk.
- Will the project cause air, soil or water pollution?	No	No pollution will be generated by the project activities.
- Will the project cause soil erosion and/or siltation?	No	Project activities will increase soil stability and water infiltration by planting trees in the project areas, thereby reducing erosion and siltation.
- Will the project result in increased waste production?	No	The project activities will not cause any increase in waste production.
- Will the project results in the production of hazardous waste?	No	No hazardous waste will be generated by the project activities.
- Will the project pose any threat to local ecosystems due to invasive species?	No	No invasive species will be used in the project. Moreover, <i>Prosopis</i> will be removed in some sites to plant indigenous trees.
- Will the project result in increased greenhouse gas emissions?	No	Project activities are likely to reduce the atmospheric concentration of greenhouse gases in project sites. This will be achieved by replanting mangroves and multiple other tree species and consequently increasing soil and plant carbon sequestration. Additionally, to the project will re-establish mangroves, which are efficient carbon sinks.
- Other environmental issues, e.g. noise and traffic	No	
<i>Only if it can be carefully justified that any negative impact from the project can be avoided or mitigated satisfactorily both in the short and long-term, can the project go ahead.</i>		

Section C: Social impacts

If negative impact is identified or anticipated the Comment/Explanation field needs to include: Project stage for addressing the issue; Responsibility for addressing the issue; Budget implications, and other comments.

	Yes/No/N.A.	Comment/explanation
- Does the project respect internationally proclaimed human rights including dignity, cultural property and uniqueness and rights of indigenous people?	Yes	All project interventions have been developed in accordance with internationally proclaimed human rights, in accordance with UN guidelines. In addition, all activities were developed in consultation with stakeholders to ensure that no rights or laws are infringed upon by the proposed activities.
- Are property rights such as land tenure recognized by the existing laws in affected countries?	Yes	Land tenure arrangements are clearly defined and both traditional and state-based rights are recognized.
- Will the project cause social problems and conflicts related to land tenure and access to resources?	No	Project risk management will also include conflict risk management systems concerning customary rights and the sharing of ecosystem services.
- Does the project incorporate plans to inform and consult affected stakeholders?	Yes	All on-the-ground activities, except those involving hard infrastructure, are implemented by local communities. They are also preceded by and include stakeholder consultations, training and public awareness campaigns.
- Will the project affect the state of the targeted country's (-ies') institutional context?	Yes	The project will strengthen institutions in Djibouti in order to integrate adaptation to climate change into management plans. National and local governments will be trained in risk evaluation and adaptation to climate change. Additionally, knowledge sharing on adaptation initiatives at the national and local scales will be increased by encouraging meetings of inter-ministerial committees, creating websites and developing other communication tools.
- Will the project result in a reduction of access to beneficial ecosystem services (e.g. reduction in water supply or loss of access to fisheries)?	No	The project is designed to enhance ecosystem services and access to resources. This includes reduced flooding and siltation at intervention sites as a result of the project activities..
- Will the project modify technologies or land-use activities that may lead to changes in present social and economic activities?	Yes	The project seeks to enhance the efficiency of current land-use systems to increase the social and economic benefits of these systems.
- Will the project cause dislocation or involuntary resettlement of people?	No	No translocation of people is required for the project activities, and local communities will be involved in all on-the-ground implementation.
- Will the project cause uncontrolled in-migration (short- and long-term) with opening of roads to areas and possible overloading of social infrastructure?	No	No new roads will be built through project activities, and no movement of people is anticipated.
- Will the project result in increased local or regional unemployment?	No	No long-term change in formal employment as a result of project activities is anticipated. Community members will be employed for short periods to achieve specific project objectives, where necessary. Livelihoods of local communities will be developed in project sites in order to improve community resilience to the effects of climate change. Additionally, microfinancing for business development will be promoted.
- Does the project include measures to reduce/remove the risk of forced or child labour?	Yes	The project conforms to all national and international guidelines and laws regarding forced labour. Extensive community

		engagement will prevent the use of forced labour, and all required labour (short term employment only, for meeting specific objectives) will be provided through community engagement and remunerated in accordance with national law.
- Does the project include measures to ensure a safe and healthy working environment for workers employed as part of the project?	Yes	The project will conform to all national and international guidelines and laws regarding health and safety for workers employed as part of the project. Community training will ensure that health and safety regulations are understood.
- Will the project affect recreational opportunities?	No	Areas used primarily for recreational activities will not be included in the project.
- Will the project negatively affect indigenous people's livelihoods or belief systems?	No	All project implementation will be carried out after stakeholder consultation and in accordance with local belief systems. Livelihoods of people in project sites will be improved through the project activities.
- Will the project disproportionately affect women or other disadvantaged or vulnerable groups?	No	The project will help to reduce the effects of climate change on the most vulnerable groups, including women, farmers and pastoralists.
- Will the project involve and or be complicit in the alteration, damage or removal of any critical cultural heritage?	No	No cultural heritage will be affected by project operations.
- Does the project include measures to avoid corruption?	Yes	All project disbursements will be monitored by UNEP administrative structures, and regular reporting by the project management team will ensure financial and administrative transparency is maintained throughout the project lifetime.
<i>Only if it can be carefully justified that any negative impact from the project can be avoided or mitigated satisfactorily both in the short and long-term, can the project go ahead.</i>		

Section D: Other considerations

If negative impact is identified or anticipated the Comment/Explanation field needs to include: Project stage for addressing the issue; Responsibility for addressing the issue; Budget implications, and other comments.

	<i>Yes/No/N.A.</i>	<i>Comment/explanation</i>
- Does national legislation in the affected country (-ies) require EIAs and/or SEAs to be conducted before commencement of this type of activity?	Yes	EIAs and SEAs will be conducted first at the commencement of the project implementation stage.
- Is there sufficient national capacity to ensure effective implementation of EIA and/or SEA requirements?	Yes	The responsibility for conducting EIAs and SEAs lies with the executing agency partner (MHUE).
- Is the project addressing issues which are already being addressed by other approaches and projects?	No	Project activities are complementary to the identified baseline projects. Additionally, during the PPG, meetings were held with the management teams of other adaptation projects ongoing in Djibouti, to ensure complementarity with their activities.
- Will the project components generate or contribute to cumulative or long-term effects on the environment or local communities?	No	No negative effects are anticipated. Positive effects will accrue.
- Is it possible to isolate the effects of this project so as to monitor E&S effects?	Yes	Indicators were developed during the PPG phase to monitor the E&S effects of the project, and additional indicators may be developed during project implementation to ensure relevant aspects of the project are monitored.

Appendix 17: UNEP comparative advantage

UNEP has experience in implementing approximately 80 projects on adaptation at global, regional and national levels worldwide. These projects develop innovative solutions for national governments and local communities to adapt to the predicted effects of climate change in an environmentally sound manner. This is achieved by: i) providing methods and tools to support decision making; ii) addressing barriers to implementation; iii) testing and demonstrating proposed solutions; and iv) enhancing climate resilience by restoring valuable ecosystems that are vulnerable to climate change. UNEP has accumulated plentiful significant body of knowledge and experience from its implementation of previous and ongoing projects. The agency will draw upon this experience during the implementation of this LDCF project. Furthermore, UNEP has a proven international and national record. In particular, UNEP has become known for its strong technical and scientific background in the field of climate change. Finally, UNEP's experience in community-based projects and natural resource management is well recognised worldwide. As such, it is an appropriate agency for providing implementation support and capacity development for enhancing climate resilience within Djibouti.

UNEP's work on climate change adaptation focuses on three main areas: i) science and assessments; ii) knowledge and policy support; and iii) building the resilience of ecosystems for adaptation. UNEP's Flagship Programme, EbA, represents a ground-breaking shift in focus in the realm of climate change adaptation. In 2011, this programme was commended at the 17th meeting of the Conference of the Parties to the UNFCCC (CoP17). It has also been endorsed by IUCN, the EC and GEF through the Operational Guidelines on "Ecosystem-Based Approaches to Adaptation" GEF/LDCF.SCCF.13/Inf.06 October 16, 2012. The EbA approach is multidisciplinary in nature. It involves managing ecosystems to enhance their resilience. In addition, it uses ecosystem services to promote climate change adaptation and disaster risk management. Furthermore, it provides a platform for engaging a broad range of stakeholders and sectors in the adaptation process. The adaptation interventions proposed in this LDCF project are well within the scope of UNEP's current work on climate change.

The GEF Council paper (C.31/15) outlines the comparative advantages of UNEP. These include providing GEF with the best available science and knowledge upon which to base investments, and provision of expertise on environmental and climate change matters. UNEP also has considerable experience in the piloting of successful innovative approaches and the implementation of adaptive learning. The LDCF project builds upon this comparative advantage. In addition, GEF Council paper (C.28/18) mentions UNEP's comparative advantage of "developing and using climate information to effect changes in relevant sectoral policies based on climate science" which is an area that is addressed by the LDCF project.

UNEP has undertaken many projects where innovative solutions and methodologies are demonstrated at inter-regional, national and local levels. All such projects comply with the mandate from the UNEP Governing Council, as detailed in the Bali Strategic Plan for Technology Support and Capacity-building.

Collaboration with the UN Country Team in Djibouti is desirable during the implementation of the LDCF project. UNEP's expertise and support will promote the inclusion of the natural environment in the UN Country Team's work. This will increase the long-term benefits of the LDCF project to the environment.

UNEP will bring to this project its experience on resource use efficiency gathered by the Division for Industry, Technology and Economics (DTIE). This will be applied to interventions aimed at improving water use efficiency. The LDCF project is consistent with UNEP's other

work in the water sector. This work is mandated by the UNEP Governing Council and is based on the UNEP Water Policy and Strategy. It also builds on the achievements of the Environmentally-sound Management of Inland Waters Programme (EMINWA) and other programmes falling under the scope of Integrated Water Resources Management (IWRM). Within this focal area, UNEP draws on its expertise in assessment and monitoring, generation and application of knowledge, and approaches for the better management of water systems. It takes EbA approaches as reference for its water-related activities.

The LDCF project will also build on UNEP DEPI's emerging Drylands Strategy as there will be a strong emphasis on promoting innovative techniques for sustainable pastoralism. Furthermore, the majority of the infrastructure and restoration interventions will be linked to and benefit from the Green Economy paradigm led by UNEP. The project will also benefit from ongoing work within UNEP towards analysing and documenting the ecological foundation of food security. Additionally, the PROVIA programme provides insight into the economic assessment of ecological services, EbA and tools for urban and coastal planning. Finally, the LDCF project will also benefit from research and demonstration efforts undertaken within the UNEP-led Integrated Marine & Coastal Environment and Resource Management project. This project provides tools for integrated sustainable management of coastal zones and marine protected areas. These UNEP-led initiatives provide additional cofinancing for this project totalling 1,76 million US\$ until 2014.

UNEP has a long history of working with the Government of Djibouti on addressing the threats of climate change. This includes the national communications to the UNFCCC, development of the NAPA and implementation of the first NAPA project. In addition, UNEP has facilitated regional partnerships which greatly improve the delivery of high quality project outputs in a cost-effective manner. This is a result of utilising the capacities built and experiences gained thus far. While not benefitting from in-country presence, UNEP works using a "direct" implementation modality through its Nairobi office. Additionally, expert technical advisors are delegated to a specific country or project. UNEP also has a regional coordination office for Africa, with a sub-office in Addis Ababa, which can provide assistance.

To date, UNEP has implemented four national projects in Djibouti including those with GEF support. Additionally, the agency has implemented four regional projects and two global initiatives with components in Djibouti. UNEP is therefore well-versed in Djibouti's national priorities with respect to climate change. It also understands the government agencies' institutional needs and capabilities with respect to climate change adaptation. UNEP also has extensive field expertise in the establishment of successful field-level projects. Using this expertise, lessons learned from the piloting of innovative approaches at the community level can be integrated into national policy, and vice-versa. The overall arrangement for this project fits well with "a stronger mandate to work at national level" given by Governments to UNEP at the Rio+20. [Rio+20, A/CONF.216/L.1].

Appendix 18: Terms of Reference for key project groups, staff and sub-contractors

A 18.1 Terms of Reference for Project Steering Committee (PSC)

Background

The PSC will be responsible for undertaking management-related and technical decisions for the project in accordance with this ToR and providing guidance and direction for the project on a regular basis.

The PSC will review and approve the Annual Work Plans (AWPs) and reports as well as the six-monthly work plans and reports. Additionally, it is required to authorise any substantive deviation from the agreed AWP and budget lines. The PSC will ensure as well that necessary resources are committed, and will arbitrate on any conflicts within the project or negotiate a solution to any problems between the project and external bodies. Last, the PSC will approve the responsibilities of the NPC.

The PSC will comprise the following members:

- director generals from key ministries and agencies: MHUE, MAPE-RH, ANM, CERD and ONEAD;
- regional governors; and
- agropastoral and craft associations.

In addition, the PSC will include, as support staff, the NPC and the CTA. The MHUE will chair the PSC. The PSC will meet at least every six months or as required by the chair of the PSC.

Scope of Work

Specific responsibilities of the PSC are as follows:

- Ensure that project objectives are fulfilled in an effective and efficient manner.
- Approve work plans and budgets, and other reports that may be required.
- Ensure effective quality assurance and financial reporting requirements.
- Ensure institutional coordination and facilitate an effective communication and decision-making process between government, implementation partners, civil society and other key actors.
- Monitor and evaluate project implementation to ensure consistency with the approved work plans and results framework of the project.
- Review, revise and approve ToRs for staff, consultants and contractors required to assist in project implementation, as proposed by the NPC.
- Propose policy revisions that would facilitate the mainstreaming of the project activities.
- Facilitate interactions between the NPC/project team and the relevant ministries or government agencies, in order to optimise project interactions.

A 18.2 Terms of Reference for National Project Coordinator (NPC)

Scope of Work

The NPC will lead the project team and provide overall operational management for the successful execution and implementation of the project. This includes the daily responsibility to manage, coordinate, and supervise the implementation of the project and the delivery of results in accordance with the project document and agreed work plans. Furthermore, the NPC will be responsible for financial management and disbursements, with accountability to the government and UNEP. The NPC will report to the CTA and the PSC.

Further responsibilities of the NPC are to:

- Oversee and manage project implementation, monitor work progress, and ensure timely delivery of outputs.
- Report to the CTA and the PSC regarding project progress.
- Develop and facilitate implementation of a comprehensive monitoring and reporting system.
- Ensure timely preparation of detailed AWP and budgets for approval by PSC.
- Write ToRs with the Chief Technical Advisor.
- Assist in the identification, selection and recruitment of staff, consultants and other experts as required.
- Supervise, coordinate and facilitate the work of the administrative/technical team (consisting of National Technical Assistants (NTAs), finance/administration staff and national and international consultants).
- Control expenditures and assure adequate management of resources.
- Provide a quarterly update of the expenses of the previous three months and the expenses expected for the next three months.
- Establish linkages and networks with the on-going activities of other government and non-government agencies.
- Provide input to management and technical reports and other documents as described in the M&E plan for the overall project. Reports should contain detailed assessments of progress in implementing activities, including reasons for delays, if any, and recommendations on necessary improvements.
- Inform the PSC, without delay, of any issue or risk which might jeopardise the success of the project.
- Liaise and coordinate with UNEP Task Manager (TM) on a regular basis.

Qualifications

- Master's degree in environment, natural resources management, agriculture or a closely related field.
- A minimum of 10 years relevant work experience including at least 6 years experience in project management in relevant sectors.
- Demonstrated solid knowledge of adaptation to climate change, ecological restoration and sustainable exploitation of natural resources.
- Experience in the public participation development process associated with environment and sustainable development is an asset.
- Experience in working and collaborating within governments is an asset as well as experience in GEF projects.
- Excellent knowledge of French and English including writing and communication skills.

Reporting

During the project implementation phase, the NPC will be a staff member of MHUE and will report to the PSC. The NPC will work closely with the PSC, CTA and TM to ensure the availability of information on progress and performance regarding the implementation of the project.

A 18.3 Terms of Reference for the Chief Technical Adviser (CTA)

Scope of Work

The CTA will provide technical guidance on the implementation of the project to the NPC. The position of CTA is likely to be filled by an international consultant, because there is currently no one available in Djibouti with the required technical expertise..

Responsibilities

- i) Provide quality assurance and technical review of project outputs.
- ii) Undertake technical review of project outputs (e.g. studies and assessments).
- iii) Write ToRs for technical consultancies with the NPC (including policy revisions when necessary).
- iv) Supervise the work of national and international consultants.
- v) Assist in monitoring the technical quality of project M&E systems (including AWP, indicators and targets).
- vi) Conduct the financial administrative reporting and the PIR.
- vii) Provide advice on best suitable approaches and methodologies for achieving project targets and objectives.
- viii) Provide a technical supervisory function to the work carried out by NTAs, and national and international consultants hired by the project.
- ix) Assist in knowledge management, communications and awareness-raising.
- x) Facilitate the development of strategic regional and international partnerships for the exchange of skills and information related to climate change adaptation.

Qualifications

- At least an advanced post-graduate at or above M.Sc. level in climate change adaptation or a related discipline such as disaster risk reduction, environmental management, natural resources management, agriculture, water resources management.
- A minimum of 5 years' experience in a senior technical lead position with planning and management of environmental and/or natural resources management programmes in developing countries.
- A minimum of 5 years in a senior technical position involved in institutional strengthening and capacity building.
- Previous similar experiences in provision of technical support to complex projects.
- Experience from West African region would be an advantage.
- Good communication and computer skills.
- Fluent in spoken and written French and English.

Reporting

The CTA will report to the chair of the PSC. The CTA will cooperate with the NPC to ensure the availability of information on progress and performance in the implementation of the project. In the performance of his/her duties, the CTA will work in close collaboration with TM, and update him/her on the project's progress. Additionally, in consultation with the TM, the CTA will take responsibility for decision-making and implementation of the project.

A 18.4 Terms of Reference of the Administrative and Financial Assistant

An administrative and financial assistant will report to the NPC.

Responsibilities

- Standardise the finance and accounting systems of the project while maintaining compatibility with the government and UNEP financial accounting procedures.
- Prepare revisions of the budget and assist in the preparation of the AWP.
- Comply and verify budget and accounting data by researching files, calculating costs and estimating anticipated expenditures from readily available information sources.
- Prepare status reports, progress reports and other financial reports.
- Process all types of payment requests for settlement purposes including quarterly advances to the partners upon joint review.

- Prepare periodic accounting records by recording receipts, disbursements (ledgers, cash books, vouchers, etc) and reconciling data for recurring or financial reports and assist in preparation of annual procurement plans.
- Undertake project financial closure formalities including submission of terminal reports, transfer and disposal of equipment, processing of semi-final revisions, and support professional staff in preparing the terminal assessment reports.
- Assist in the timely issuance of contracts and assurance of other eligible entitlements of the project personnel, experts, and consultants by preparing annual recruitment plans.

A 18.5 Terms of Reference for the National Technical Assistants (NTA)

Under the supervision of the NPC, a NTA will be hired to coordinate and monitor implementation of activities at provincial level. The NTA will be responsible for the coordination of activities within the project areas. The NTA will work closely with the NPC and the CTA to effectively manage the project at local level.

Responsibilities

- Act as a liaison with provincial authorities and institutions.
- Oversee and manage project implementation, monitor work progress, and ensure timely delivery of outputs in provinces.
- Report to the NPC and CTA regarding project progress. Reports should contain assessments of the progress of implementing activities, including reasons for delays, if any, and recommendations on necessary improvements.
- Support the NPC in developing and facilitating implementation of a comprehensive monitoring and reporting system.
- Support in the preparation of detailed annual work plans and budgets for approval by PSC.
- Supervise, coordinate and facilitate the work of the technical staff in the provinces.
- Provide input to management and technical reports, and other documents as described in the M&E plan for the overall project.
- Participate in the PSC meetings and coordinate project site visits.

Qualifications

- Bachelor degree in environment, natural resources management, agriculture or a closely related field.
- A minimum of 5 years relevant work experience.
- Demonstrated solid knowledge of environment and ecological restoration.
- Experience in the public participation development process associated with environment and sustainable development an asset.
- Experience in working and collaborating with local authorities an asset.
- Excellent knowledge of French, English and at least one of the major local languages including writing and communication skills.

A 18.6 General Terms of Reference for International Consultants

The types of international consultants required by the project are included after the project budget in Appendix 1. These consultants will be hired to perform the following tasks:

- Collect data.
- Provide advice relevant to their field.
- Monitor interventions.

Additionally, the international consultants must be experts in their field, with experience in climate change, capacity building, and research and information development. The

international consultants should have good knowledge and understanding of Djibouti's climate change risks. They should have an appropriate M.Sc. degree and a minimum of 5 years' experience or an appropriate bachelor's degree and 10 years experience in their field of expertise. Fluency in spoken and written French and English is required. Fluency in one of the major local languages will be an advantage.

A 18.7 General Terms of Reference for National Consultants

Local expertise will be sourced where possible in place of international expertise in order to strengthen in-country capacity. National consultants will be hired by the project to:

- Collect data.
- Provide advice relevant to their field.
- Monitor interventions.

Additionally, the national consultants must be experts in their field, ideally with experience in climate change, capacity building, and research and information development. Additionally, they should have good knowledge and understanding of Djibouti's climate change risks and an appropriate M.Sc. degree and a minimum of 5 years experience or an appropriate bachelor's degree and 10 years experience in their field of expertise. National consultants need to be fluent in spoken and written French and English.

The hiring procedures to be followed for both international and national consultants must include a transparent and competitive process based on normal UNEP procedures.

A 18.8 General Terms of Reference for national focal points/ teams

The ToRs of the national focal points and teams in the different ministries will be drafted upon initiation of the project and endorsed by the PSC.

A 18.9 Key elements of the Terms of Reference for the national company conducting the EIA, SIA and SEA

Scope of Work

The national company will conduct EIA, SIA and SEA (where required) in order to verify that none of the LDCF project activities will have a negative impact on the environment or the local population. The impact assessment conducted will be aligned with national laws, UNEP guidelines on EIA and SEA, and International Association for Impact Assessment (IAIA) guidelines. This position will be fulfilled by a national company specialised in Impact Assessments (IAs) in order to increase national capacity and create jobs.

Responsibilities

The national company will:

- i) Prepare a checklist of environment impacts that will be assessed during the national company mission for each activity.
- ii) Involve the local communities as much as possible in the IA process by explaining to them the principles and results of IAs, and involving them in the decision making process resulting from the outcomes of the IA.
- iii) Assess the impact of the activities of Component 1 (water-reservoirs, gabion walls, levees and boreholes) and Component 2 (mangrove and acacia woodland restoration) of the LDCF project including their impact on:
 - water flow particularly downstream;
 - water quantity and quality in the surrounding areas and downstream;
 - water infiltration;

- sedimentation along the wadi bed;
- siltation of water reservoir;
- erosion of wadi banks;
- desertification; and
- local communities' activities (e.g. the construction of fences to protected restoration areas).

iv) Assess the impact of the activities of Component 3 (construction of agropastoral plots and alternative livelihood development) of the LDCF project such as their impact on:

- soil structure;
- soil composition (e.g. the use of fertilizers and pesticides, aviculture);
- erosion and desertification;
- indigenous species (fauna and flora);
- water infiltration; and
- local communities' sustenance, health, lifestyle and income.

v) Assess the impact of the activities of Component 4 (increase of technical and institutional capacity of government and communities) of the LDCF project including their impact on:

- land use, desertification and indigenous species (e.g. potential policy changes in agriculture and natural resource management); and
- local communities' sustenance, health, lifestyle and income.

vi) Check that the actual policies and plans are consistent with the Environmentally and Socially Sustainable Development (ESSD) and propose policy revision accordingly, if necessary.

vii) Provide guidelines to prevent the negative impact of the LDCF project activities if any and to increase the positive impact of the project activities.

viii) Assess the appropriate alternative designs and/or locations to assist the PM and CTA in modifying the activities that could potentially be detrimental, if any, in order to prevent any negative impact on the environment or the local communities.

ix) Provide guidelines on the changes to be, if any, to the baseline study.

x) Propose a monitoring system/mechanism to check that the IA recommendations are followed during the implementation of the project activities.

Qualifications

- At least an advanced post-graduate at or above M.Sc. level in natural resource management or environment protection.
- A minimum of 10 years' experience in Environment and Social Impact Assessments.
- Strong knowledge of national and international environment policies.
- Fluent in spoken and written French and English.

Reporting

The national company will report to NPM and the CTA. The hired company will work closely from the beginning of their contract with the NPM and the CTA to ensure that the activities are clearly defined and understood, and share all necessary information. The deliverable is a report including an extensive evaluation (both qualitative and quantitative) of the potential environment and social impacts of each of the LDCF project activities as well as their probability of occurrence. Additionally, clear guidelines on the problems to address and alternative non-detrimental activities/practices will be provided.

A 18.10 Key elements of the Terms of Reference of the PhD and Master student

PhD and Master students will be hired to: i) measure the impact of the project activities on the local communities; and ii) conduct a cost-benefit analysis of the project activities. Hence,


two master students will investigate the benefits of the diversification of livelihood options for the local communities including food security, health and income. The PhD project will be conducted concomitantly to the project implementation phase and will compare the economic costs of the LDCF project to the benefits it provides in term of resilience to climate change. The data collected and the outcomes of these research projects will be used by the government for upscaling the activities and will be valuable information for further climate change adaptation projects as well as private sector investments.

Appendix 19: Co-financing commitment letters from project partners

REPUBLIQUE DE DJIBOUTI
Unité - Egalité - Paix

MINISTRE DE L'AGRICULTURE,
DEL'EAU, DE LA PÊCHE, DE L'ELEVAGE
ET DES RESSOURCES HYDRAULIQUES

جمهورية جيبوتي
الوحدة - المساواة - السلام



وزارة الزراعة والتربية الحيوانية
والصيد البحري
والمسئولة عن الموارد المائية

هاتف : ٢٥ ١٢ ٩٧
تلكس : ٤٨١١ ج
فلكس : ٧٨ ٣٥ ٣١ (٢٥٢)
ص.ب. ٤٥٢

Tel: (253) 35 12 97
Tel: (253) 35 57 97
Tlx: 5811 DJ
Fax: (253) 35 58 79
B.P. 453 - Djibouti

N° 213 /SG/MAEPE-RH

Djibouti, le 10 2 NOV 2013

LE SECRETAIRE GENERAL

Maryam Niamir Fuller
Director, GEF Coordination Office
Block 2, North Wing, Ground Floor
UNEP
PO Box 30553 Nairobi, Kenya
email: Maryam.niamir-fuller@unep.org
tel : (254 20) 762-4166
cell : (254 702) 116-176
www.unep.org

Subject: Ministry of Agriculture, Fisheries, Livestock and Hydraulic Resources of Djibouti-co-financing commitment to the GEF LDCF project entitled "Implementing adaptation technologies in fragile ecosystems of Djibouti's central plains"

The Ministry of Agriculture, Fisheries, Livestock and Hydraulic Resources(MAPE-RH) of Djibouti is responsible for developing and enforcing Djibouti's national environment policies and development strategies in the primary sector and rural areas.

This letter serves to confirm the Ministry of Agriculture, Fisheries, Livestock and Hydraulic Resources's co-financing support of a total of **US\$ 12,800,000** in total to the above-mentioned GEF LDCF project through the following projects for which MAPE-RH is the executing agency for:

- The PROMES-GDT (Programme De Mobilisation Des Eaux De Surface Et De Gestion Durable des Terres) project of a total value of US\$ 3,000,000 for Surface Water Availability Increase and Sustainable Land Management that seeks to improve the livelihoods of rural communities through the sustainable use of natural resources. The programme is focused mainly on three areas, including the Day Forest, Randa-Makarassou and Dora regions in Tadjourah. The PRODERMO project activities includes: i) building and repairing water reservoirs, water retention basins for pastoral plots and micro-dams to increase water availability; and ii) improving fodder availability by establishing fenced grazing plots to exclude livestock and facilitate the recovery of fodder plants. The LDCF project will: i) benefit from lessons learned as well as guidelines developed by the PROMES-GDT; and ii) increase the sustainability of the PROMES-GDT interventions.
- The PRODERMO (Projet de Développement Rural Communautaire et Mobilisation des Eaux) project of a total value of US \$5,800,000 for Rural Communities Development and Water Availability that seeks to increase the access of rural communities to water and strengthen their capacity to manage water and agropastoral resources using a participative approach for the development of local communities. PRODERMO was designed to maximise the synergies of PROMES-GDT activities and to target areas that are not covered by PROMES-GDT, namely, Hanlé, some zones of Tadjourah, and KhorAngar and Oulma in Obock. The PRODERMO project activities includes: i) the construction of water reservoirs, water retention basins, wells, the rehabilitation of boreholes, and the equipping of all of these with solar-powered pumps; ii) the rehabilitation and demarcation of six pastoral plots of 400 ha each; and iii) the development of alternative livelihoods such as

handicrafts. The LDCF project will: i) benefit from the water management infrastructure built by the PRODERMO; ii) increase the climate resilience of the PRODERMO project activities; and iii) promote the use of an EBA approach.

- The Djibouti government's Project of Support to the Development of Date Palm Cultivation (PDPD) of a value of US \$ 500,000 that aims to encourage the cultivation of date palms nationally. The activities of the PDPD include the creation of a laboratory for the asexual propagation of date palm trees to meet the increasing demand. The PDPD will provide valuable scientific information and genetic material that will be beneficial for the LDCF project.
- The Djibouti government's Project on Water Supply and Sanitation in: i) the Rural Areas of Tadjoura, Arta and Ali Sabieh districts; ii) the district centres of Tadjoura and Ali Sabieh (PWSSRA) of a total budget of US \$10,100,000, for which US\$ 3,500,000 will be used as co-financing for this project. This project aims to sustainably improve the living conditions of the populations of the Tadjoura, Arta and Ali Sabieh regions. The project activities include: i) constructing water management infrastructure; ii) conducting public awareness campaigns to promote hygiene; iii) creating Water Management Committees; and iv) training local communities in the maintenance of water management material. The LDCF project will enhance the WSSRA's activities by: i) providing local communities with training on sustainable resource use, alternative livelihoods and accessing microfinance loans to improve the living conditions of the rural populations in Tadjourah; and ii) increasing the climate resilience of the communities' livelihoods and the infrastructure constructed by the PWSSRA project.

PRODERMO, PROMES-GDT, PWSSRA and PDPD are well-aligned with and support the GEF LDCF project entitled *Implementing*

adaptation technologies in fragile ecosystems of Djibouti's central plains which intends to strengthen rural communities' resilience to climate change, particularly floods and droughts, in the regions of Hanlé and Tadjourah in Djibouti.

This collaboration will provide mutual benefits for the PRODERMO, PROMES-GDT, PWSSRA and PDPD and the above-mentioned GEF LDCF project.

We look forward to your continuing cooperation.

Yours sincerely,

IDRISS ABDOU ALI



- CC:** - Ministre MAEPE/RH
- Ministre de l'Habitat et de l'Environnement
- Ministre MEFIP

Appendix 20: Endorsement letters of GEF National Focal Points

ROYAUME DE DJIBOUTI
UNITE - DIGNITE - PAIX

LE MINISTRE DE L'AMENAGEMENT DU TERRITOIRE ET DE L'ENVIRONNEMENT (MATE)

DIRECTION DE L'AMENAGEMENT DU TERRITOIRE ET DE L'ENVIRONNEMENT (DATE)

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



جمهورية جيبوتي
الوحدة - الميثاق - السلام

وزارة الإسكان والتعمير والتنمية

إدارة التهيئة الترابية والبيئة

Djibouti, le 05/07/11
N° 2881/ATE/11

Le DIRECTEUR

To: Mariam Niamir Faller
Director, GEF Coordination Office
UNEP, Nairobi

Subject: Endorsement for implementing adaptation technologies in fragile ecosystems of Djibouti's central plains

In my capacity as GEF Operational Focal Point for Djibouti, I confirm that the above project proposal (a) is in accordance with my government's national priorities including its priorities identified in the National Adaptation Plan of Action of Djibouti and my commitment to the relevant global environmental conventions; and (b) was discussed with relevant stakeholders, including the global environmental convention focal points.

I am pleased to endorse the preparation of the above project proposal with the support of the GEF Agency(ies) listed below. If approved, the proposal will be prepared and implemented by UNEP. I request the GEF Agency(ies) to provide a copy of the project document before it is submitted to the GEF Secretariat for CSO endorsement.

The total financing (from GEF, LDCF and/or SCCF) being requested for this project is US\$8,182,350, inclusive of project preparation grant (PPG), if any, and Agency fees for project cycle management services associated with the total GEF grant. The financing requested for Djibouti is detailed in the table below.

Source of Funds	GEF Agency	Focal Area	Amount (in US\$)			
			Project Preparation	Project	Fee	Total
LDCF	UNEP	CC	78,500	7,360,000	743,850	8,182,350
(select)	(select)	(select)				0
(select)	(select)	(select)				0
(select)	(select)	(select)				0
Total GEF Resources			78,500	7,360,000	743,850	8,182,350

Sincerely,

Abdoulh Omar
Le Directeur

[Operational Focal Point of GEF and Director of Environment]

Copy to (delete as necessary):
Convention Focal Point for UNEP/CC
Convention Focal Point for UNEP/SP
Convention Focal Point for LDCF/CD
Convention Focal Point for Stockholm (POPs)

Appendix 21: Draft procurement plan

The financial management of the project will be undertaken by UNEP, owing to complications with the national procurement process. Consequently, the GEF funds will be disbursed through contracts, MoUs or LoAs between the UNEP and the individual consultants, under guidance from the EA. The national partner institutions will contribute to the outcomes based on their respective expertise and financial capabilities.

The table below specifies the technical assistance consultancies planned for Outcomes 1, 2, 3 and 4 (including both local and international consultants).

Local consultants	\$/person month	Estimated person months	Tasks to be performed
National Technical Assistant (NTA)	1000	48	The NTA will have the following responsibilities: i) act as a liaison with regional authorities and institutions; ii) oversee and manage project implementation, monitor work progress, and ensure timely delivery of outputs in provinces; iii) report to the NPC and CTA regarding project progress. Reports should contain assessments of progress in implementing activities, including reasons for delays, if any, and recommendations on necessary improvements; iv) support the NPC in developing and facilitating implementation of a comprehensive monitoring and reporting system; v) support in the preparation of detailed annual work plans and budgets for approval by PSC; vi) supervise, coordinate and facilitate the work of the technical staff in the project areas; vii) provide input to management and technical reports and other documents as described in the M&E plan for the overall project; and viii) participate in the PSC meetings and organise visits to project sites.
Hydrologist	2500	7	A national consultant (NC) with proven expertise in hydrology (hydrologist) will provide technical assistance in the construction of: i) a levee in Tadjourah (activity 1.1.2); and ii) gabion walls in Hanlé and Tadjourah (activities 1.1.2 to 1.1.4).
Hydrogeologist	2500	9.5	The NC hydrologist will work closely with another NC with proven experience in hydrogeology to: i) verify the suitability of the sites chosen for borehole construction (activities 1.1.5 to 1.1.7); ii) advise on borehole construction (activities 1.1.5 to 1.1.7); iii) provide technical advices for the construction of the reservoirs (activity 1.1.8); and iv) advise on the training to provide to local communities for the maintenance of the boreholes (activity 4.2.1).
Specialist in wastewater	2500	4.5	The NC will: i) investigate the water distribution system in Tadjourah mosques and select one of the mosques for the reuse of ablution water; and

			ii) design and implement a pilot study for collecting that water and reuse it for irrigation in surrounding gardens (activity 1.2.3).
Botanist	2500	8	The NC will work closely with other NCs and IC to: i) select plants for Acacia woodlands restoration (activity 2.1.1); ii) establish nurseries (activity 2.1.2); and iii) select the plantation sites (activity 2.1.1).
EbA specialist	2500	7	The NC will work closely with other NCs and IC to: i) select appropriate sites for the establishment of RHT and train local communities on the use of RHT (activity 2.1.3); and ii) develop and implement a public awareness campaign on the importance of <i>Acacia</i> woodlands (activity 2.1.6).
Socio-economic specialist	2500	4	The NC will work closely with NTAs, other NCs and IC to: i) design a management plan to label the plantation areas as protected areas; and ii) engage with community leaders and local communities to set aside the plantation areas (activity 2.1.4).
Agriculture specialist	2500	3	The NC will work closely with other NCs and IC to: i) investigate the type of threat (e.g. camels, goats) on the plantation areas; and ii) select and implement the appropriate fencing protocol (activity 2.1.5).
Mangrove specialist	2500	11	The NC will: i) advise on the necessity of dredging the mangrove plantation site and, if necessary, develop a protocol for the construction of a canal (activity 2.2.1); ii) establish mangrove nurseries (activity 2.2.3); iii) provide training of local communities in planting and maintaining mangroves (activity 2.2.5); and iv) develop and implement a public awareness campaign on the importance of mangroves (activity 2.2.6).
Agriculture specialist	2500	28	The NC will work closely with NTAs to: i) select the sites for the construction of the agropastoral plots (activities 3.1.1 and 3.1.2); ii) use the vulnerability assessment conducted during the baseline study to select the beneficiaries of the project and engage with the corresponding communities (activity 3.1.3); iii) design the structure of the individual agropastoral plot (0.5 ha) and of the collective agropastoral plot (8 to 10 ha) (activity 3.1.1); iv) guide community members undertaking the construction of the agropastoral plots (activities 3.1.1 and 3.1.2); v) train communities on best agropastoral practices using a learning-by-doing approach (activities 3.1.5 and 3.1.6); vi) select climate-resilient plants and establish nurseries (activity 3.1.7); vii) train agropastoralists in techniques for product preservation (activity 3.1.9); and viii) select the sites for the establishment of RHT and train local communities on the use of these technics (activity 3.1.10).

Animal husbandry specialist	2500	2	The NC will: i) select one agropastoralist per plot to learn about animal husbandry; and ii) organise a training workshop with the selected agropastoralists in animal husbandry (activity 3.1.8).
Irrigation specialist	2500	4	The NC will work closely with other NCs and ICs to: i) select the best farmer's package in the intervention sites; ii) investigate the financial options to purchase them; and iii) train local communities in the purchasing and use of these packages (activity 3.1.10).
Finance specialist	2500	4	The NC will investigate the financial options available for the development of agropastoral value chains (activity 3.1.12).
Apiculture specialist	2500	2	The NC will: i) develop the protocol to introduce apiculture in the agropastoral plots; ii) purchase the appropriate material; and iii) train local communities in apiculture practices (activity 3.2.1).
Aviculture specialist	2500	2	The NC will: i) develop the protocol to introduce aviculture in the agropastoral plots; ii) purchase the appropriate materials; and iii) train women within local communities in aviculture practices (activity 3.2.2).
Microfinance specialist	2500	4	The NC will work closely with other NCs to: i) engage with local banks and microfinance institutions to identify the financial option suitable for local economic development; and ii) support agropastoralists in taking small loans to develop their businesses (activity 3.2.4).
Policy specialist	2500	4	The NC will work closely with the climate risk specialist (see below) to: i) investigate the options to integrating climate change into development policies; ii) identify the appropriate policy makers within the government to be trained in the consideration of climate change in development planning; and iii) train the policy makers in vulnerability and risk assessments, and upscale of the results into national development (activity 4.1.2).
Climate risk specialist	2500	4	The NC will work closely with the management team of the NDRAMS project to: i) investigate the required trainings for the appropriate use of the new EWS system in Tadjourah; and ii) train the risk management unit and local associations in the use of EWS (activity 4.1.3).
IT specialist	2500	9.6	The NC will: i) design a website for information sharing; ii) advertise the website to the management team of the ongoing and forthcoming environment projects; iii) provide training to the selected stakeholders on the use of the website; and iv) maintain the website during the implementation period and develop a strategy for the maintenance of the website beyond the end of the project (activity 4.1.5).
Agriculture	2500	3	The NC will:

specialist			i) engage with the local communities to create management committees; and ii) provide training to the committee members in best agropastoral practices and water management (activity 4.2.1).
Agronomist	2500	4	The NC will: i) engage with local communities to create agropastoral cooperatives; and ii) provide training in product marketing (activity 4.2.2).
Education specialist	2500	4	The NC will work with the Centre of Research, Information and Production of the Ministry of National Education (CRIPEN ¹¹²) to: i) identify schools in the intervention sites, the number of students and teachers and ii) organise public awareness campaigns in each school (activity 4.2.4).
International consultants	\$/person week	Estimated person weeks	Tasks to be performed
Chief Technical Advisor (CTA)	2500	42.4	The CTA will have the following responsibilities: i) Provide quality assurance and technical review of project outputs. ii) Undertake technical review of project outputs (e.g. studies and assessments). iii) Assist in the drafting of ToRs for technical consultancies. iv) Supervise the work of national and international consultants. v) Assist in monitoring the technical quality of project M&E systems (including AWP, indicators and targets). vi) Conduct the financial administrative reporting and the PIR. vii) Provide advice on best suitable approaches and methodologies for achieving project targets and objectives. viii) Provide a technical supervisory function to the work carried out by NTAs, and national and international consultants hired by the project. ix) Assist in knowledge management, communications and awareness-raising. x) Facilitate the development of strategic regional and international partnerships for the exchange of skills and information related to climate change adaptation.
Specialist in hydrology	2500	24.2	The international consultant (IC) will work closely with the NC to: i) select the materials and develop the protocol for the construction of gabion walls and boreholes; and ii) oversee the construction activities with a particular focus on their sustainability (activities 1.1.2 to 1.1.8).
Specialist in renewable energy	2500	6.4	The IC will work closely with NCs to: i) design the protocol of the pilot study to test hybrid solar- and wind-powered pumping system; and ii) implement the pilot study (activity 1.1.9).
EbA specialist	2500	17.8	The IC will provide technical assistance for the implementation of the EbA interventions (activities

¹¹² Centre de Recherche, d'Information et de Production de l'Éducation Nationale

			2.1.1 to 2.1.6)
Mangrove specialist	2500	8.8	The IC will work closely with NCs to: i) design the protocol for the planting activities; ii) develop the public awareness campaign on the importance of mangroves; and iii) provide support to the NCs when necessary in the mangrove restoration activities during the implementation period (activities 2.2.1 to 2.2.6).
Specialist in adaptation to climate change	2500	15.6	The IC will: i) provide technical assistance to the NCs in selecting the restoration, replanting and RHT sites according to climate predictions; ii) assist the NCs in selecting climate resilient species; and iii) provide support to the NCs when necessary in the realisation of the activities of Component 2 during the implementation period (activities 2.1.1 to 2.2.6).
Agriculture specialist	2500	24.2	The IC will: i) provide technical assistance to the NCs in selecting the construction sites; ii) assist the NCs in selecting climate resilient species and assist in designing the best planting plans according to state-of-the-art knowledge in agriculture; and iii) provide support to the NCs when necessary during the development of the agropastoral plots (activities 3.1.1 to 3.1.10).
M&E expert	2500	18.2	The consultant will undertake the following M&E tasks: i) baseline assessment; ii) mid-term evaluation; and iii) final evaluation.

In terms of procurement of non-expendable equipments, final allocations will be undertaken during the inception period. The following are estimated costs.

Items	Approximate equipment costs
Computer equipment	40,800
Office supplies	26,000
Office rental	19,200

Appendix 22: Definition of Terms

Levees: Elongated earth embankments that are broad at the base and taper to a level top, where temporary sandbags can be placed.

Gabion walls: 1 m x 1 m free-draining walls that are constructed by filling wire mesh baskets with rock. They are constructed perpendicular to riverbed slopes.

Wadi: Ephemeral riverbed that only contains water after intensive rainfall events, or has an intermittent stream.

Oasis ecosystem: Manmade ecosystem consisting of agriculture around water points, usually boreholes and/or other water infrastructure. Agriculture includes fodder crops, food crops and palm trees.

Half-moon: Half-moon trenches dug on gentle slopes with the removed soil placed downslope¹¹³.

Zai: Traditional land rehabilitation technology whereby small pits, 20-30 cm in diameter and 10-20 cm deep, are dug and approximately two handfuls of organic material (animal dung or crop residue) is placed. Seeds are planted in the pits with the first rainfall.

Contour earthen bunds: Generally u-shaped embankments around fields to capture runoff and channel to fields. Sometimes, shorter inner arms are added which divide the field into smaller basins and improve the distribution of the captured runoff¹¹⁴.

Stone rows: Walls of large rocks tightly packed with smaller rocks for reinforcement to slow runoff.

Straw mulching: Application of straw from fodder and/or cereal crops to the soil surface to maintain soil moisture and reduce evaporation.

¹¹³ Barry, B., Olaleye, A.O., Zougmore, R. & Fatondji, D. 2008. Rainwater harvesting technologies in the Sahelian zone of West Africa and the potential for outscaling. International Water Management Institute. IWMI Working Paper 126, Colombo, Sri Lanka. 40p.

¹¹⁴ UNEP. Sourcebook of Alternative Technologies for Freshwater Augmentation in Africa. Technical Publication 8a. <http://www.unep.or.jp/ietc/publications/techpublications/techpub-8a/bunds.asp>.

Appendix 23: Tracking tools



Climate Change Adaptation - LDCF/SCCF Adaptation Monitoring and Assessment Tool

Goal: Support developing countries to become climate resilient by integrating adaptation measures in development policies, plans, programs, projects and actions

Impact: Reduced absolute economic losses at country level (including loss of life, property and ecosystem services) due to climate change, including variability

Indicator: Economic loss trend over a project period and beyond due to climate change, including variability

Metric: Total property loss per event in \$US/ Number of people affected by event during the project lifetime (Use CRED or Country Data)

Objective 1: Reduce vulnerability to the adverse impacts of climate change, including variability, at local, national, regional and global level

Outcome and Output Indicators	Metric	Target at CEO Endorsement	Baseline
Outcome 1.2: Reduced vulnerability in development sectors			
		Female	Male
		Female	Male

Indicator 1.2.14	Vulnerability and risk perception index (Score) - Disaggregated by gender	<p>The score for this indicator will have to be assigned based on the results of a conducted survey. The score ranges from 1 to 5 and below are the explanations of the rankings:</p> <ol style="list-style-type: none"> 1. Extreme Vulnerability 2. High Vulnerability 3. Medium Vulnerability 4. Low Vulnerability 5. No Vulnerability 	4	4		2	2
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Output 1.2.1: Vulnerable physical, natural and social assets strengthened in response to climate change impacts, including variability

			Type	Level		Type	Level
Indicator 1.2.1.2	Resilient infrastructure measures introduced to prevent economic losses	Type and level	Flood protection (Gabion walls)	Local level (7 wadis)		One sand levee	Local level (one wadi)

Outcome 1.3: Diversified and strengthened livelihoods and sources of income for vulnerable people in targeted areas

	Female	Male		Female	Male
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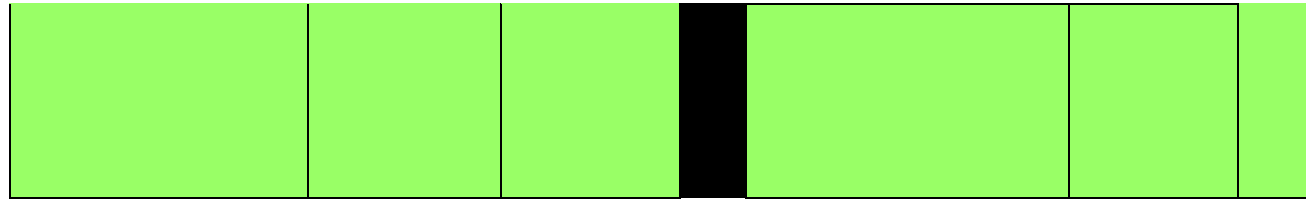
<p>Indicator 1.3.1</p>	<p>Households and communities have more secure access to livelihood assets</p>	<p>Score - Disaggregated by gender. Score for this indicator will have to be assigned based on the results of a conducted survey. The score ranges from 1 to 5 and below are the explanations of the rankings: 1. No access to livelihood assets 2. Poor access to livelihood assets 3. Moderated access to livelihood resources 4. Secure access to livelihood resources 5. Very secure access to livelihood resources</p>	<p>4</p>	<p>4</p>	<p></p>	<p>1</p>	<p>2</p>
<p>Output 1.3.1: Targeted individual and community livelihood strategies strengthened in relation to climate change impacts, including variability</p>						<p></p>	
<p>Indicator 1.3.1.1</p>	<p>% of targeted households that have adopted resilient livelihoods under existing and projected climate change</p>	<p>%</p>	<p>70%</p>		<p></p>	<p>0 targeted households</p>	
<p>Objective 2: Increase adaptive capacity to respond to the impacts of climate change, including variability, at local, national, regional and global level</p>							
<p>Outcome 2.2: Strengthened adaptive capacity to reduce risks to climate-induced economic losses</p>							
			<p>Female</p>	<p>Male</p>	<p></p>	<p>Female</p>	<p>Male</p>

Indicator 2.2.2	Capacity perception index	Score (1 - 5) to be disaggregated by gender 1. No capacity built 2. Initial Awareness raised (e.g.workshops, seminars) 3. Substantial training in practical application (e.g. vocational training) 4. Knowledge effectively transferred (e.g. passing examination, certification) 5. Ability to apply or disseminate knowledge demonstrated	1	1		3	3
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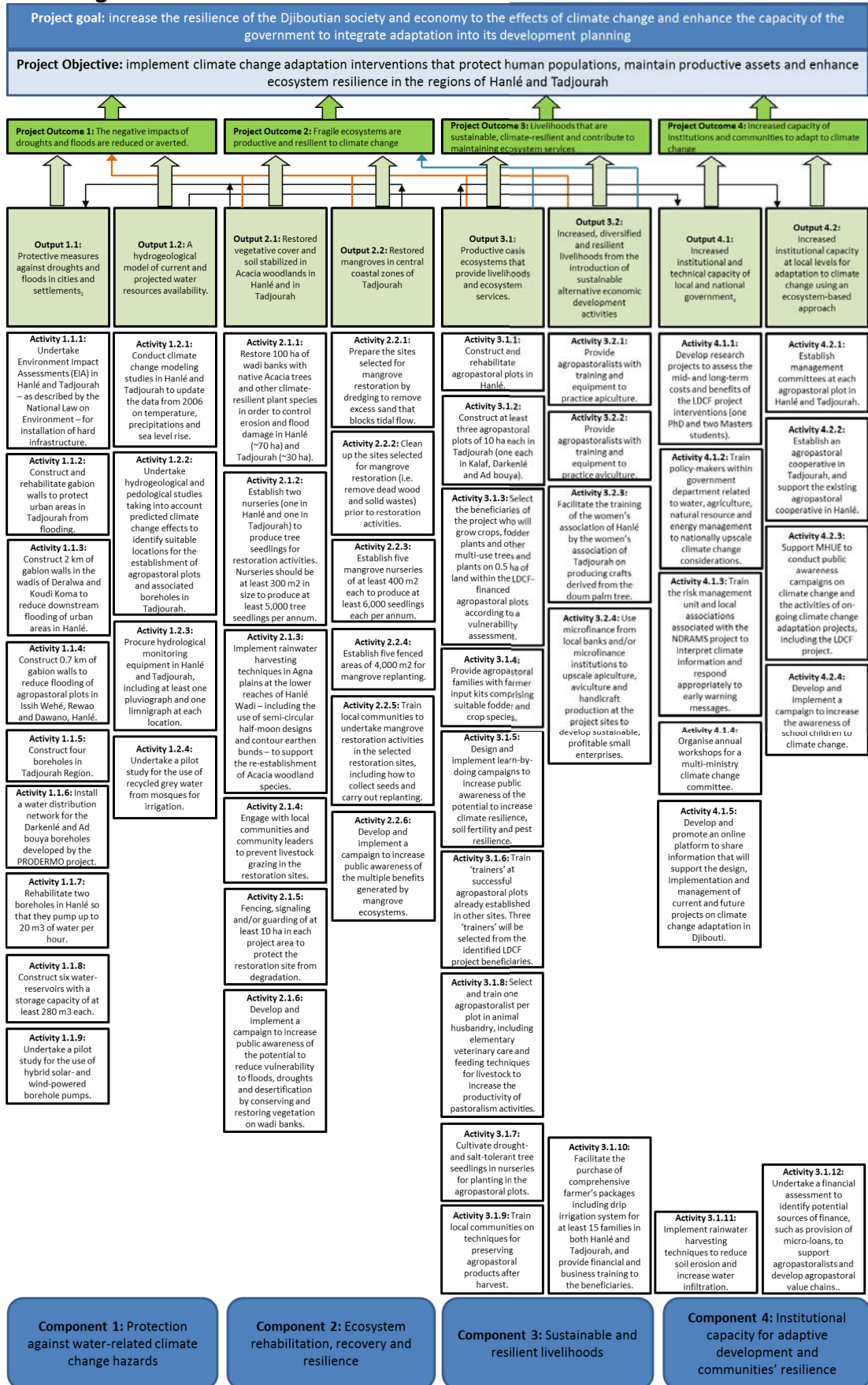
Output 2.2.1: Adaptive capacity of national and regional centers and networks strengthened to rapidly respond to extreme weather events

Indicator 2.2.1.1	No. of staff trained on technical adaptation themes (disaggregated by gender). Themes:	Theme:	Female	Male		Theme:	Female	Male
	- Monitoring/Forecasting capacity (Early Warning System (EWS), Vulnerability mapping system)	Capacity development	5	10		Capacity development	0	
	- Policy reform -Capacity development	Agriculture diversification	10	20		Agriculture diversification	0	
	Sustainable forest management - Agriculture diversification - Improved resilience of agricultural systems - Strengthening infrastructure - Supporting livelihoods - Mangrove reforestation - Coastal drainage/irrigation system - Community-based adaptation - Erosion control/soil water conservation - Microfinance	Mangrove reforestation	10	20		Mangrove reforestation	0	

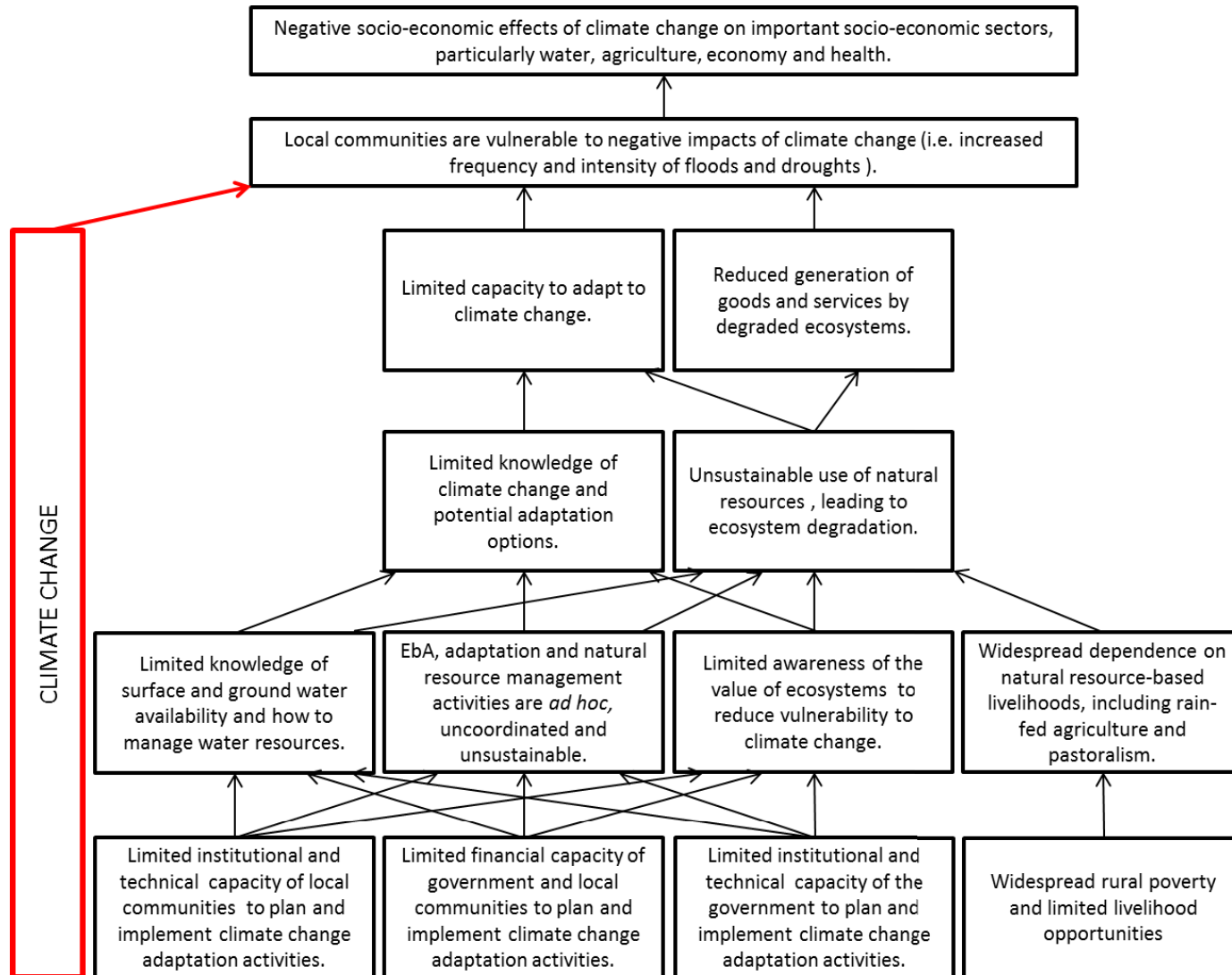
- Special Programs for women
- Livelihoods
- Water storage
- Information and communication technologies (ICT) and information dissemination
- Other



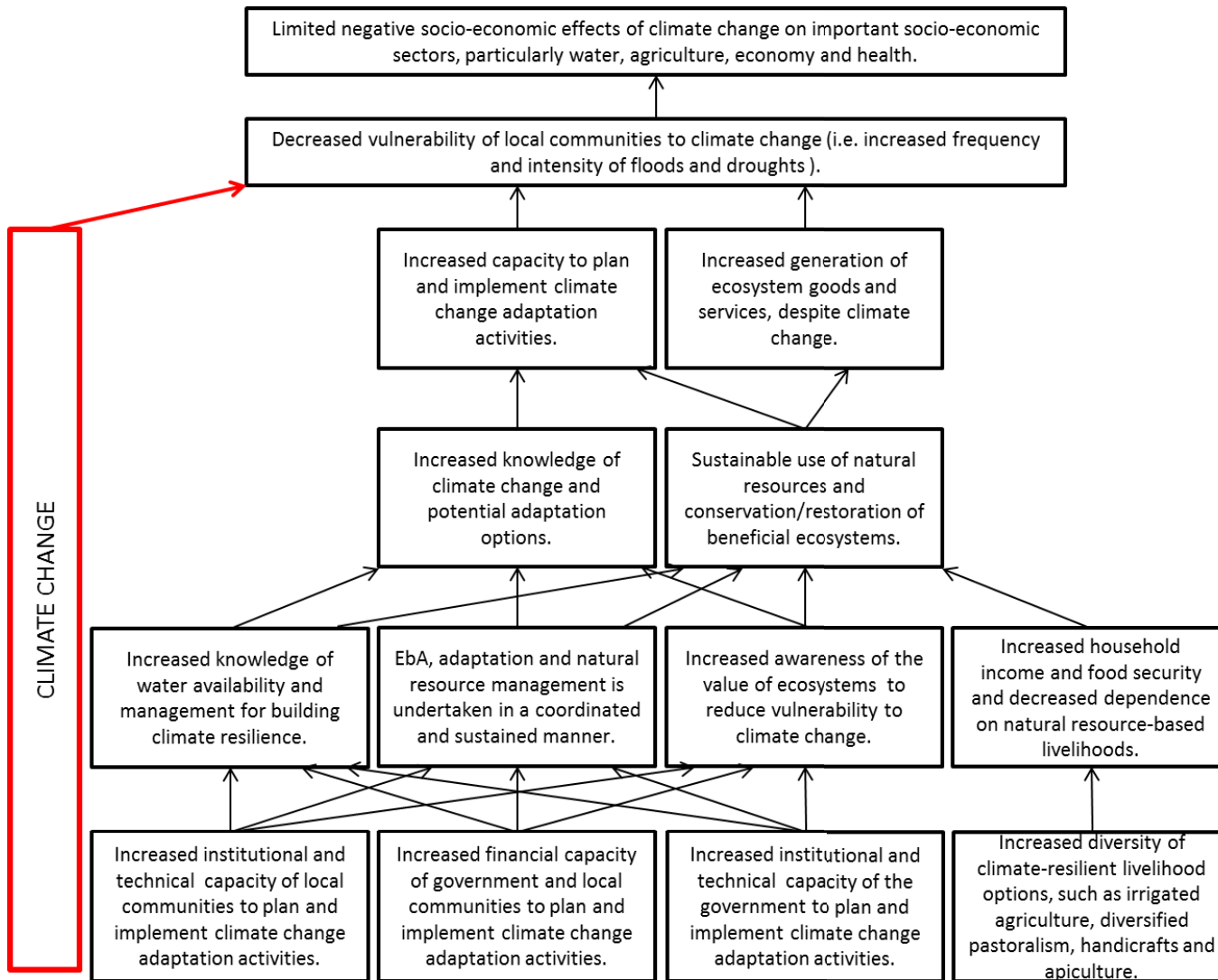
Appendix 24: Linkages between LDCF project Components, Outcomes and Outputs including related activities.



Appendix 25: Theory of change, problem and solutions trees.



Appendix 25.1: Problem Tree



Appendix 25.2: Solution Tree

Appendix 26: Link between the baseline projects and the LDCF project

Baseline projects and intervention sites	Goals and activities	Climate change hazards affecting the baseline project area	Impacts to the baseline projects and targeted populations as a result of climate change	Adaptation measures supported by the proposed LDCF project	How the proposed LDCF project will contribute towards increasing the resilience of the baseline project
<p>PROMES-GDT</p> <ul style="list-style-type: none"> - Day area in Tadjourah - Barra area in Arta - South West of Dikhil 	<p>Improve livelihood of pastoral communities by promoting sustainable management of natural resources, including the following activities:</p> <ul style="list-style-type: none"> - Develop a programme to increase water availability; - Build water management infrastructure (e.g. water tanks and micro-dams); - Increase national capacity for the management of surface water and land use. 	<p>Increased frequency and intensity of drought events.</p> <p>Increased variability and unpredictability of precipitation.</p>	<p>Decreased availability and quality of water resources for human population and livestock.</p> <p>Increased damage to water management infrastructure as a result of sedimentation and physical impacts of floods.</p> <p>Reduced availability and quality of water as a result of drought-related effects such as salinisation and excessive abstraction of groundwater.</p> <p>Reduced quality of water as a result of flood-related effects such as sedimentation, pollution and waterborne diseases.</p> <p>Reduced resilience and productivity of fragile ecosystems – including mangroves, woodlands, rangelands and riparian areas – as a result of changing rainfall and</p>	<p>Restoration of degraded watersheds, pastoral rangelands, riparian areas and mangroves using a combination of EbA and hard engineering techniques.</p> <p>Detailed hydrological and pedological studies to assess availability and quality of water resources in the project districts, including consideration of climate change effects.</p> <p>Rehabilitation and construction of climate-resilient water storage and supply infrastructure.</p> <p>Rehabilitation and construction of climate-resilient flood protection infrastructure, including gabion walls and sand levees.</p>	<p>Increased resilience of water management infrastructure to climate and climate change-related hazards such as droughts, floods and erratic rainfall.</p> <p>Scientifically rigorous information to guide the location and appropriate design of sustainable, climate-resilient water management infrastructure.</p> <p>Increased knowledge and technical capacity at national and local levels to plan and implement sustainable, climate-resilient water management practices under conditions of climate change.</p> <p>Increased knowledge and technical capacity at national and local levels to plan and implement locally appropriate and cost-effective adaptation measures, including both</p>

			temperature patterns as well as the physical impact of floods.		EbA and hard engineering approaches.
<p>PRODERMO</p> <ul style="list-style-type: none"> - Eastern area of Obock - Central area of Dikhil - Coastal area of Tadjourah 	<p>Increase the access of rural communities to water and increase capacity to manage natural resources such as water and pastoral rangelands through activities such as:</p> <ul style="list-style-type: none"> - Increase ground and surface water availability for human consumption, agriculture and livestock by: building water management infrastructure (e.g. water tanks, micro-dams, wells, boreholes) - Increase the productivity of pastoral areas by restoring degraded pastoral areas; - increase diversity of rural livelihoods, including through establishment of pilot projects based on development of fisheries and craft markets; - Increase national, regional and local capacity for the formulation and implementation of the annual water and pastoral resources management plan in the intervention sites. 	<p>Increased frequency and intensity of drought events.</p> <p>Increased frequency and intensity of floods.</p> <p>Increased variability and unpredictability of precipitation.</p>	<p>Increased damage to water management infrastructure as a result of sedimentation and physical impacts of floods.</p> <p>Reduced availability and quality of water as a result of drought-related effects such as salinisation and excessive abstraction of groundwater.</p> <p>Reduced quality of water as a result of flood-related effects such as sedimentation, pollution and waterborne diseases.</p> <p>Reduced resilience and productivity of fragile ecosystems – including mangroves, woodlands, pastoral rangelands and riparian areas – as a result of changing rainfall and temperature patterns as well as the physical impact of floods.</p>	<p>Detailed hydrological and pedological studies to assess availability and quality of water resources in the project districts, including consideration of climate change effects.</p> <p>Detailed geological studies to assess the productivity and suitability for grazing of pastoral rangelands, including consideration of climate change effects.</p> <p>Rehabilitation and construction of climate-resilient water storage and supply infrastructure.</p> <p>Rehabilitation and construction of climate-resilient flood protection infrastructure, including gabion walls and sand levees.</p> <p>Establishment and training of management committees to operate and maintain water management infrastructures sustainably and under climate change conditions.</p>	<p>Increased resilience of water management infrastructure to climate and climate change-related hazards such as droughts, floods and erratic rainfall.</p> <p>Scientifically rigorous information to guide the location and appropriate design of sustainable, climate-resilient water management infrastructure.</p> <p>Increased resilience of pastoral rangelands to climate change effects through reducing unsustainable management practices and providing alternative livelihood options.</p> <p>Increased cost-effectiveness of PRODERMO investments through providing information on successes and failures of alternative livelihood options and best-practice implementation protocols under climate change conditions.</p>

				<p>Training of stakeholders to implement sustainable and climate-resilient agropastoralism activities.</p> <p>Development of sustainable, climate-resilient alternative livelihoods such as handcrafts, apiculture and aviculture.</p>	
<p>PWSSRA</p> <p>- Rural areas of Tadjourah, Arta and Ali Sabieh</p>	<p>Increase access to sanitation and availability of water for people and livestock through activities such as:</p> <ul style="list-style-type: none"> - Construction of water tanks, boreholes and water points; - Construction of school latrines; - Implementation of public awareness campaigns on hygiene; - Provision of water management infrastructure; and - Building of technical capacity for water management and training of management committees for drinking water and sanitation. 	<p>Increased frequency and intensity of drought events.</p> <p>Increased frequency and intensity of floods.</p> <p>Increased variability and unpredictability of precipitation.</p>	<p>Increased damage to water management infrastructure as a result of sedimentation and physical impacts of floods.</p> <p>Reduced availability and quality of water as a result of drought-related effects such as salinisation and excessive abstraction of groundwater.</p> <p>Reduced quality of water as a result of flood-related effects such as sedimentation, pollution and waterborne diseases.</p>	<p>Introduction of techniques for recycling of grey water in urban areas.</p> <p>Establishment of water management committees and increased awareness on the sustainable use and maintenance of water resources and water management infrastructure.</p> <p>Detailed hydrological and pedological studies to assess availability and quality of water resources in the project districts, including consideration of climate change effects.</p> <p>Restoration of degraded watersheds, riparian areas and mangroves using a combination of EbA and hard engineering techniques.</p>	<p>Increased national and local technical capacity for sustainable management of water resources and infrastructure, including through the establishment of efficient local water management committees and appropriate training tools.</p> <p>Increased resilience of water management infrastructure to climate and climate change-related hazards such as droughts, floods and erratic rainfall.</p> <p>Scientifically rigorous information to guide the location and appropriate design of sustainable, climate-resilient water management infrastructure.</p>
PDPD	Promote the sustainable	Increased	Reduced productivity and	Establishment and	Increased productivity and

	<p>cultivation of date palm trees in arid areas through activities such as:</p> <ul style="list-style-type: none"> - Increased protection of date palm trees; - Creation of a laboratory for in-vitro propagation to support increased cultivation of date palm trees; and - Increased genetic diversity of date palm trees. 	<p>frequency and intensity of drought events.</p> <p>Increased frequency and intensity of floods.</p>	<p>rate of establishment of date palm trees as a result of drought and reduced availability of water for irrigation.</p> <p>Increased mortality of date palm trees as a result of flood damage.</p>	<p>demarcation of sustainable, productive agropastoral plots, including the provision of appropriate agricultural inputs and irrigation infrastructure.</p> <p>Construction and rehabilitation of hard infrastructure such as gabions and levees for flood protection.</p> <p>Provision of training on climate-resilient agropastoral practices and appropriate crop choices, including planting date palm trees.</p> <p>Introduction of appropriate drought- and salt-tolerant plant species to agropastoral plots, including date palm trees as well as other beneficial plant species.</p>	<p>rate of establishment of date palm trees as a result of improved access to irrigation.</p> <p>Increased productivity and rate of establishment of date palm trees as a result of reduced impact of floods.</p> <p>Increased capacity for sustainable cultivation of date palm trees within agropastoral plots.</p>
<p>UNEP-IUCN-WAMIP project</p>	<p>Establish a process for policy reform to support the transition of the pastoralism sector towards a green economy and to achieve its social, economic and environmental potential through the following measures:</p> <ul style="list-style-type: none"> - Increase knowledge and awareness of 	<p>Increased frequency and intensity of drought events.</p> <p>Increased frequency and intensity of floods.</p>	<p>Reduced productivity and economic returns from pastoralism as a result of reduced water availability and reduced forage production.</p>	<p>Establishment and demarcation of sustainable, productive agropastoral plots, including the provision of appropriate agricultural inputs and infrastructure to supply and store water.</p> <p>Training of stakeholders to implement sustainable and</p>	<p>Scientifically rigorous information to guide the development of pastoral activities in Hanlé and Tadjourah.</p> <p>Increased resilience of pastoral rangelands to climate change effects by reducing unsustainable management practices and</p>

	<p>policy-makers of pastoralism as a land management option;</p> <ul style="list-style-type: none"> - Establish protocols for long-term adaptive management of landscape; and - Prepare policy frameworks to support the inclusion of pastoralism into relevant land management policies. 			<p>climate-resilient agropastoralism activities.</p> <p>Development of sustainable, climate-resilient alternative livelihoods such as handcrafts, apiculture and aviculture.</p>	<p>providing alternative livelihood options.</p> <p>Increased local and national capacity to implement sustainable and climate-resilient agropastoral practices.</p>
<p>UNEP-EbAFoS project</p>	<p>Build resilience of food production systems and enhance food security using EbA approaches in countries in Sub Saharan Africa, including the following activities:</p> <ul style="list-style-type: none"> - Enhancing the links between science and policy by monitoring and evaluating the effect on food security of demonstration EbA approaches; - Strengthening of government capacities to integrate EbA approaches into national food security policies and plans; and - Dissemination of lessons learned on EbA to a wider African audience. 	<p>Increased frequency and intensity of drought events.</p> <p>Increased frequency and intensity of floods.</p>	<p>Reduced food security and agricultural productivity, particularly in rainfed agriculture, as a result of drought, reduced annual rainfall and unpredictable onset of rainfall.</p> <p>Reduced food security and agricultural productivity as a result of physical damage from climate-related hazards such as floods.</p> <p>Ongoing degradation of vulnerable ecosystems due to unsustainable exploitation of natural resources during periods of food insecurity and poverty.</p>	<p>Research projects and scientific publications on the effects of EbA interventions on the local communities in the intervention sites to provide protocols, cost-effectiveness estimates and increase knowledge base for EbA.</p> <p>Development of sustainable, climate-resilient alternative livelihoods such as handcrafts, apiculture and aviculture.</p> <p>Provision of training on climate-resilient agropastoral practices and appropriate crop choices.</p> <p>Introduction of appropriate drought- and salt-tolerant plant species to agropastoral plots,</p>	<p>Reduced food insecurity in Hanlé and Tadjourah through the establishment and demarcation of sustainable, productive agropastoral plots, including the provision of appropriate agricultural inputs and infrastructure to supply and store water.</p> <p>Increased resilience of ecosystems to climate change effects through reducing unsustainable management practices and providing alternative livelihood options.</p> <p>Increased knowledge and technical capacity at national and local levels to plan and implement locally appropriate and cost-effective adaptation measures, including both EbA and hard engineering</p>

				including date palm trees as well as other beneficial plant species.	approaches.
UNEP-European Commission ENTRP project	Strengthen the climate change resilience and adaptive capacity of communities and societies in SIDS who are highly dependent on ecosystem services in tropical coastal ecosystems, through activities including the following: <ul style="list-style-type: none"> - Demonstration of integrated planning tools and technical guidance to assist in the development of coastal EbA interventions; - Support relevant authorities and communities in two SIDS in the selection, planning and implementation of practical EbA interventions; and - Support regional capacity-building for EbA development and implementation including informing supportive adaptation policies, strategies and adaptation plans and upscale the activities. 	Increased frequency and intensity of drought events. Increased frequency and intensity of floods.	EbA measures are undermined by ongoing negative effects of climate change – including physical damage from floods as well as slow-onset hazards such as drought – which result in degradation of ecosystems and decreasing provision of ecosystem goods and services.	Restoration of degraded watersheds, riparian areas and mangroves using a combination of EbA and hard engineering techniques. Construction and rehabilitation of hard infrastructure such as gabions and levees for flood protection. Research projects and scientific publications on the effects of EbA interventions on the local communities in the intervention sites to provide protocols, cost-effectiveness estimates and increase knowledge base for EbA.	Increased resilience of EbA activities to climate change-related hazards as a result of the introduction of complementary hard engineered adaptation measures such as gabion walls. Increased knowledge and technical capacity at national and local levels to plan and implement locally appropriate and cost-effective adaptation measures, including both EbA and hard engineering approaches.