GLOBAL ENVIRONMENT FACILITY
INVESTING IN OUR PLANET

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April 21, 2014

Dear LDCF/SCCF Council Member:

UNDP as the Implementing Agency for the project entitled: ***Sudan: Climate Risk Finance for Sustainable and Climate Resilient Rainfed Farming and Pastoral Systems***, has submitted the attached proposed project document for CEO endorsement prior to final approval of the project document in accordance with UNDP procedures.

The Secretariat has reviewed the project document. It is consistent with the proposal approved by LDCF/SCCF Council in November 2012 and the proposed project remains consistent with the Instrument and LDCF/SCCF policies and procedures. The attached explanation prepared by UNDP satisfactorily details how Council's comments 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 ENDORSEMENT

PROJECT TYPE: FULL-SIZED PROJECT
TYPE OF TRUST FUND: LDCF

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PART I: PROJECT INFORMATION

Project Title: Climate risk finance for sustainable and climate resilient rain-fed farming and pastoral systems – Sudan			
Country(ies):	Sudan	GEF Project ID:[1]	4958
GEF Agency(ies):	UNDP	GEF Agency Project ID:	4591
Other Executing Partner(s):	Higher Council for Environment and Natural Resources (HCENR)	Submission Date: Resubmission Date:	Feb. 5, 2014 March 26, 2014
GEF Focal Area (s):	Climate Change	Project Duration(Months)	52
Name of Parent Program (if applicable): ➢ For SFM/REDD+ ☐ ➢ For SGP ☐	n/a	Agency Fee ($):	570,000

A. FOCAL AREA STRATEGY FRAMEWORK[2]

Focal Area Objectives	Expected FA Outcomes	Expected FA Outputs	Trust Fund	Grant Amount ($)	Co financing ($)
CCA-2	**Outcome 2.1** Increased knowledge and understanding of climate variability and change-induced risks at country level and in targeted vulnerable areas	**Output 1.1.1:** Risk and vulnerability assessments conducted and updated; **Output 2.1.2** Systems in place to disseminate timely risk information	LDCF	1,650,000	5,500,000
CCA-2	**Outcome 2.2** Strengthened adaptive capacity to reduce risks to climate-induced economic losses	**Output 2.2.1** Adaptive capacity of national and regional centers and networks strengthened to rapidly respond to extreme weather events **Output 2.2.2** Targeted population groups covered by adequate risk reduction measures, disaggregated by gender.	LDCF	3,800,000	12,500,000
		Project Management Cost	LDCF	250,000	800,000
		Total project costs		5,700,000	18,800,000

[1] Project ID number will be assigned by GEFSEC.
[2] Refer to the Focal Area/LDCF/SCCF Results Framework when completing Table A.

B. PROJECT FRAMEWORK

Project Objective: To increase climate resilience of rainfed farmer and pastoral communities in regions of high rainfall variability through climate risk financing.						
Project Component	**Grant type**	**Expected Outcomes**	**Expected Outputs**	**Trust Fund**	**Indicative Grant Amount ($)**	**Indicative co-financing ($)**
Institutional framework and capacity for sustainable climate observation and early warning	INV/ TA	1. Institutional and technical capacity for climate observation, forecasting and early warning strengthened at national and local levels	1.1 Rainfall modelling and simulations for six target states (River Nile, Gedarif, North Kordofan, and South Darfur, Kassala and White Nile States) to enable local flood forecasts and climate projections(INV: US$ 285,000) 1.2 Procurement of 7 climate AWS, 6 synoptic AWS and 162 rain gauges; purchase of high resolution remote sensing data; and capacity reinforcement related to new products/equipment to enhance the availability, quality and transfer of real-time weather/climate data collection on 130,000 ha of drought-prone land for drought early warning (INV: US$ 971,000) 1.3 SMA, RSA and MoWRE are trained to provide sustainable services on weather/climate observation, risk analysis, forecasting and early warning including the establishment of a farm information management system and the revitalization of targeted seasonal forecast delivery for rain-fed farmers and pastoralists (INV/TA: US$ 210,000) 1.4 Improved communication protocols and mechanisms (i.e. partnership with mobile phone operators) to provide timely and accurate weather and climate risk forecasts to rain-fed farmers and pastoralists in 6 target states (INV/TA: US$ 84,000)	LDCF	1,550,000	3,300,000

Capacities to design and deploy weather index-based insurance to address residual risk and promote long term adaptation	TA	2. Residual climate risk to rural livelihoods in the states of greatest rainfall variability addressed through parametric insurance products	2.1 Comparative analysis and feasibility assessment of different business models for index-based insurance (TA: US$ 90,000) 2.2 At least 6 index based s (e.g., weather index insurance) designed and introduced, covering at least 45,000 farmers and pastoralists who depend on rain-fed farming systems, including the creation of a nationally-based WII marketing and development team (TA: US$ 938,000) 2.3 Insurance literacy programme / awareness campaign designed and delivered to small businesses, community-based organisations, local farmers and pastoral communities (TA: US$ 605,000) 2.4 Legal and regulatory framework for risk transfer in target states assessed, policy recommendations developed and reinsurance secured. (TA: US$ 267,000)	LDCF	1,900,000	7,600,000

Financial service provision for farmers and pastoralists to increase adaptive capacity of rural livelihoods	TA	3. Improved access of vulnerable farmers and pastoralists to financial services for climate change adaptation and disaster risk reduction	3.1 In each state at least 1 adaptation options/packages developed to inform and enable the provision of MFI credit packages to stimulate smallholder adaptation and disaster risk reduction including the transfer of adaptation technologies to make crop and livestock production more resilient (TA: US$ 354,100) 3.2 Legal and regulatory frameworks reviewed, analysed and improved to increase the co-provision of microcredit and micro-insurance services (TA: US$ 367,100) 3.3 At least three micro-credit, flexible loan products designed and tested to account for pastoral mobility and income cycles of smallholder rainfed farmers and pastoralists (SRFP) (TA: US$ 519,500) 3.4 Organization and capacity development for smallholder rainfed farmers and pastoralists (SRFP) on newly developed and targeted financial services including training on a financial services management manual (TA: US$ 759,500)	LDCF	2,000,000	7,100,000
Sub-total					5,450,000	18,000,000
Project management cost (PMC)					250,000	800,000
Total project costs					**5,700,000**	**18,800,000**

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

Please include letters confirming co financing for the project with this form

Sources of Co-financing	Name of Co-financier (source)	Type of Co-financing	Co-financing Amount ($)
Private	Shiekan Insurance and Re-insurance Co., Ltd.	Grant	3,200,000
National Government	Agricultural Research Corporation	In-kind	2,000,000
National Government	Agricultural Bank of Sudan	In-kind	7,000,000
Local Government	Kassala, Gedarif, River Nile, North Kordofan, White Nile and South Darfur States	In-kind	3,000,000
Local Government	Higher Council of Environment	In-kind	1,000,000
National Government	Sudan Meteorological Authority	In-kind	2,000,000
GEF Agency	UNDP	Cash	600,000
Total Co-financing			**18,800,000**

D. TRUST FUND RESOURCES REQUESTED BY AGENCY, FOCAL AREA AND COUNTRY[1]

GEF AGENCY	TYPE OF TRUST FUND	FOCAL AREA	Country name/Global	Project amount (a)	Agency Fee (b)	Total c=a+b
UNDP	LDCF	Climate change adaptation	Sudan	5,700,000	570,000	6,270,000
Total GEF Resources				**5,700,000**	**570,000**	**6,270,000**

[1] In case of a single focal area, single country, single GEF Agency project, and single trust fund project, no need to provide information for this table. PMC amount from Table B should be included proportionately to the focal area amount in this table.

[2] Indicate fees related to this project.

E. CONSULTANTS WORKING FOR TECHNICAL ASSISTANCE COMPONENTS:

Component	Grant Amount ($)	Cofinancing ($)	Project Total ($)
International Consultants	480,000	0	480,000
National/Local Consultants	508,700	0	508,700

F. DOES THE PROJECT INCLUDE A "NON-GRANT" INSTRUMENT? NO

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

PART II: PROJECT JUSTIFICATION

A. DESCRIBE ANY CHANGES IN ALIGNMENT WITH THE PROJECT DESIGN OF THE ORIGINAL PIF[3]

1. No significant changes were made to the original PIF. All Outputs have been detailed and contextualized and Outputs in all Components have been restructured to emphasize the needs highlighted during the project preparation phase as noted during workshops and bilateral/multi-lateral consultations. An amendment to all components has been to target six states rather than four due to the need to address NAPA priorities in additional states. Also, this second NAPA project in Sudan (to be referred to as LDCF2) will build off the first NAPA project (to be referred to as LDCF1) by providing access to financial services to the former beneficiaries who have adopted adaptation technologies. In newly targeted states, beneficiaries will be trained in adaptation technologies/options and receive capacity reinforcement to have sustainable access to financial services. In effect, resources will be maximized across more states and more beneficiaries will be targeted under the LDCF2 project. Relative to PIF projections, the land area which will benefit from LDCF funds will increase from 30,000 to 130,000 ha and the number expected beneficiaries for insurance products will increase from 30,000 to 45,000.

2. Specific updates to the outputs include the following:

3. In Component 1, other than updating the equipment to be procured/rehabilitated and specifying the responsible agency and purpose (e.g., for localized flood forecasting), Output 1.3 has added the following ideas:

- Establishment of a farm information management system
- Revitalization of targeted seasonal forecasts

4. In Component 2, the number of Weather-Index based Insurance (WII) products expected to be developed will increase from 1 to 6. At least one WII product in each state will be developed in order to account for the different climate regimes and livelihoods in each state (i.e., dependent on the crops cultivated and the rainfall received). Livelihood categorizations were taken from the FEWS NET database. Furthermore, Output 2.2 within Component 2 will enable the creation of a nationally based WII marketing and development team to build WII awareness and literacy and have national capacity to adapt WII products as new data and sources of data become available, even after project completion.

5. Component 3 has combined expected Outputs 3.3 and 3.4 in order to ensure that microfinance (MF) product development is based on seasonally or market-based repayment schedules. Also, Output 3.1 has been clarified so that adaptation "option/packages" rather than "plans" will be offered with MF products. As an example, drought-resistance seeds will be an adaptation package included in MF products in order to ensure that Smallholder Rain-fed Farmers and Pastoralists (SRFP) practice more sustainable cultivation thereby ensuring their ability to not default on loan repayments.

6. Finally, Output 3.4 in Component 3 has been added to include an output for organizing and training SRFP. Providing insurance and microfinance services to groups offers the advantages of reducing costs, facilitating training whereby only group leaders need to be trained and reducing the need for physical collateral (members of the group can guarantee each other's loans). Training will be included for Training of Trainers such as extension officers so that they can have the capacity to provide training to SRFPs. Capacity reinforcement has been emphasized in Components 2 and 3 because WII products (and therefore combined MF/WII products) have never been developed and offered in Sudan previously. Significant training such as guidance from a financial services management manual (to be developed with LDCF funds) and organization of SRFP will be required.

A.1 National strategies and plans or reports and assessments under relevant conventions, if applicable, i.e. l

[3] For questions A.1 –A.7 in Part II, if there are no changes since PIF and if not specifically requested in the review sheet at PIF stage, then no need to respond, please enter "NA" after the respective question

NBSAPs, national communications, TNAs, NCSA, NIPs, PRSPs, NPFE, Biennial Update Reports, etc.

Not Applicable (NA).

A.2. GEF focal area and/or fund(s) strategies, eligibility criteria and priorities.

N/A

A.3 the GEF Agency's comparative advantage:

N/A

A.4. The baseline project and the problem that it seeks to address:

7. Smallholder rain-fed farmers and pastoralists (SRFP) no longer have adequate means to reduce their sensitivity to climate change, extreme weather, market adjustments and other associated risks described above. Beyond a lack of reliable rainfall forecasting and early warning in rain-fed areas, smallholder farmers and pastoralists lack a sufficient earnings and capital base to make their livelihood systems more resilient to highly variable climate risks. There is thus a need to apply alternative, proactive approaches to increase the productivity of farmers and pastoralists, so that they can become more resilient to risks and escape a downward trend towards extreme poverty and dependence on humanitarian aid post extreme events.

8. While autonomous efforts to manage and diversify climate risk are on-going in Sudan (e.g., the first LDCF-funded project which is promoting adaptation technologies for agriculture and water), SRFP have limited access to capital and remain trapped in low-productive survivalist practices that are highly sensitive to climate change. The high risk status of rain-fed climate sensitive farmers and pastoralists currently hinders their ability to access microfinance services, which prevents their ability to have means to more effectively engage in resilient agricultural production, develop productive livelihood capital and gain protection from covariate risks. Banks, MFIs and other financial service providers simply have no incentive to serve this high risk customer segment. Consequently, microfinance products are not designed to consider the specific needs of rain-fed farmers and pastoralists. SRFP are forced to borrow at high interest rates and purchasing loan products that have inflexible payment schedules. There is also limited access of rain-fed farmers / pastoralists to MF because they often live in remote locations that are not serviced regularly by financial outlets. Such an effect increases both the cost of lending for microfinance institutions, and the cost of borrowing for farmers. It has also led to a low awareness among SRFP in available financial service products.

9. Furthermore, the insurance industry is currently incapable of covering the risks faced by SRFP. For example, during the severe drought of 2000, the insurance industry experienced a 103% loss ratio in their livestock insurance scheme due to exorbitant rates of claims. In spite of the high potential for agricultural insurance in Sudan, evidenced by steady growth in insurance coverage, transaction costs remain too high. In addition, with traditional insurance products, premium costs are expected to increase as climate-related risks become more prevalent in scale and intensity. The net effect is that insurance coverage is enjoyed only by the wealthier segment of the agricultural sector, bypassing the most vulnerable farmers and pastoralists engaged in rain-fed agriculture and pastoralism, who are effectively trapped in climate poverty.

10. Additionally, SRFP are reluctant to enter into traditional microfinance or insurance plans for various reasons; insurance compensation criteria are not clear due to complex regulatory frameworks and convoluted dispute resolution processes. The choice of private insurance companies is also relatively low (~2) preventing competition and reduction of premiums. Similarly, microfinance services have very strict collateral requirements. This has pushed farmers and pastoralists to engage with informal lending sources, which generally have higher interest rates but are more flexible in terms of lending requirements and repayment processes. However, informal loans are typically small in quantity and scale because lenders generally receive personal guarantees rather than real collaterals. As such, informal loans are not geared to assist large populations nor to assist in cases of dispute or non-repayment due to the absence of a legal framework.

11. Exacerbating the problem of access to financial services by SRFP is the fact that there are limited linkages between small holders and farming technologies, which can help them adapt to climate change (exceptions include previous adaptation interventions in select locations such as the first LDCF-funded project). Consequently, SRFP are not familiar with how the technologies can help them build resilience to climate change (e.g., using rainwater harvesting to mitigate the impacts of drought). Similarly, there is no link between Microfinance/Micro-insurance (MF/MI) and weather/climate/agricultural/livestock information. Finally, on a national level, there is a lack of appropriate polices, legislation, and support to facilitate the adoption of adaptation technologies with financial services.

12. Sudan also has limited coverage of weather stations to validate insurance pay-outs when extreme weather events occur. Most States have between 1 and 3 weather stations. However, according to recommended WMO standards (one station covering a 20 km radius), in some states hundreds of rain gauges are needed to be installed for full coverage. Similarly, national satellite image production institutes have limited means to validate crop yields, as they have in the past; image data licenses have expired and freely available satellite images do not have fine enough resolution to be used to validate insurance claims. Consequently, and as noted in Stakeholder consultation meetings during the project preparation phase, SRFP are consistently discontent with pay-outs and are tending to avoid using insurance schemes.

13. The combination of a limited hydro-meteorological monitoring network and satellite imaging capability with high rainfall variability, has meant that many important regions and populations vulnerable to climate hazards are not monitored (e.g., soil moisture is not monitored in drought-prone areas and intense rainfall is not monitored in areas frequently subjected to flooding). At present, Sudan is unable to effectively provide weather forecasts and climate scenarios to help with drought and flood early warning. Exacerbating this issue is that many agencies (at least 10) within Sudan are working ad-hoc and independently to produce early warnings. As a result, rain-fed farmers/pastoralists are lacking consistent, localized weather/climate forecasts/predictions and many potentially threatening hazards have not been anticipated. The most recent flood in August 2013, which made international headlines, has been a case in point where the national hydro-meteorological services were unable to predict the impact of the floods and little of the associated mass destruction was foreseen and could be mitigated.

14. The institutional, financial, technological and informational barriers in Sudan include the following

- Insufficient coverage of weather, climate and hydrological monitoring infrastructure
- Limited cross-sectorial data sharing and institutional collaboration
- Limited availability and sustainability of tailored weather/climate information and agricultural advisories
- Long approval and complicated compensation process for existing insurance products
- No experience with weather index based insurance products
- Lack of customized and understandable microfinance services for rural clients

15. Other baseline projects have tried to address these barriers and problems (See Table C above). The project will build off of on-going early warning, adaptation, and MF/MI based projects which are planned or have demonstrated success on the ground. The following baseline projects, detailed below, will be used to support and co-finance the LDCF2 project.

16. ***The National Disaster Risk Management Programme in Sudan*** (2.27 million USD, 2013-2016) will begin implementation in late 2013 in Kassala State for flood risk management as well as work in two (2) other states for drought risk reduction. These states may include: North Darfur, North Kordofan, Northern State or Red Sea State depending upon the stability and security situation. The programme is a joint project funded by UNDP, BCPR, UNEP and ISDR. Relative to the LDCF2 project, the programme has a relevant output regarding strengthening EWS in a gender-sensitive manner through hazard monitoring, data analysis and warning dissemination. The project plans on improving the EWS by, i) forming a multi-sectorial National Early Warning Committee to provide EWS policy advise and technical guidance, ii) providing training for SMA, MoWRE and RSA on new technologies and data interpretation, iii) preparing SOPs on the dissemination of EWSs, iv) training SMA volunteers (e.g., from amongst teachers, imam mosques, farmer's unions) on weather data reporting, v) procuring and installing 2,000 rain gauges in states at high risk of flood and drought disasters, vi) providing warning dissemination equipment to HAC and Civil Defence offices and,

vii) providing a computer cluster to SMA for weather analysis, forecasting and climate predictions. Another output of the project plans to implement flood and drought risk reduction strategies at state and community levels including, i) community training, drills, awareness-raising on drought and flood mitigation schemes, ii) forming a multi-sectorial DRR committee to lead state and community strategies for drought and flood mitigation, and iii) identifying high risk locations which require flood and drought mitigation.

17. ***The Food Security Policy and Strategy Capacity Building Programme*** (FSPS, 8.6 million Euro, 2013-2016, EU-FAO) is also developing early warnings in Sudan but from a food security perspective. This project is designed to support the selected State Governments of Blue Nile, South Kordofan, Kassala and Red Sea in addressing the capacity gaps related to i) Food security inter-sectorial institutional coordination framework, food security policy and information system; and ii) Line ministries' policy planning, budgeting, monitoring and implementation capacity.

18. In terms of Micro-finance initiatives, IFAD has been assisting the Agricultural Bank of Sudan Microfinance Initiative (***ABSUMI***, USD 2 million) to provide nano-finance loans and savings to rural women cooperatives since 2010. Due to the great success of the project (100% repayment and 98% outreach achieved), the Government of Sudan has requested IFAD to provide support to upgrade ABSUMI to a full-fledged rural development initiative under the name of the ***Rural Women Economic Empowerment and Development Programme***. The programme's main focus will be to support rural women through organizational support and financial services. To enhance the impact of the financial services on the targeted households' incomes and food security, the programme will provide technical support and training to women in crop production, livestock production, vocational training, household economy and nutrition, and business development management skills. The programme objective is to establish 32 separate microfinance units under the governances in 7 states to reach around 800,000 clients with rural financial services in 8 years. The geographic areas to be covered by the new programme will be North and South Kordofan States, Sennar, White Nile, River Nile State, Kassala, Gadarif, Red Sed and Gezira States (common States with the LDCF2 project being North Kordofan, White Nile, River Nile, Kassala and Gedarif).

19. Another baseline initiative involving micro-insurance and microfinance development is the ***Connecting Farmers to Market*** project (CBS, Khartoum bank, 36.5 million USD).[4] This project has enabled farmers to be more productive by using MF lending services linked with micro-insurance to support crop production and livestock. The project has not yet focused on solely pastoralists but rather agro-pastoralists. The services provided to farmers include MF/MI, savings, agricultural extension services and access to markets. The WFP is currently providing Food for Training. The project covers the states of White Nile, Blue Nile, North Darfur, West Darfur, South Darfur, North Kordofan, South Kordofan, Red Sea, Gedarif and Kassala states (common states with the LDCF2 project being Gedarif, Kassala, North Kordofan and White Nile). Currently, the Farmers to Market project is in its 4th season. At present, approximately 42,000 farmers and 13,500 agro-pastoralists have received microfinance and micro-insurance services. Training has been provided to the farmers on micro-insurance and savings (Note: MFIs have different payment schedules and target different crops in each state). Al-Tawania is managing the insurance, the Sudanese Microfinance Development Corporation (SMDC) is managing the funds, CBOS has acted as the fund distributor and regulatory body while WFP and the Agricultural Bank of Sudan have acted as the main buyers. (The Bank of Khartoum was an important shareholder during previous seasons.)

20. Relative to adaptation technologies, a baseline project is the ***Seed Development Project*** (2011 – 2017, USD 17.5 million supported by IFAD). This project is testing the model of a private public partnership (PPP) between private seed companies, the farmers and the public extension services to produce and market certified seeds for smallholder, traditional rain-fed farmers who generally grow less than fifteen feddans (6.3 ha) of land. The project area is composed of 4 localities: Rahad and Sheikan in North Kordofan and Abbassiya and Abu Gubeiha in South Kordofan. A minimum of approximately 108,000 traditional rain-fed smallholder farmers, of which at least 30,000 women, are expected to benefit from the Seed Project through increased returns from the use of quality certified seed. Furthermore, around 1,280 seed growers in approximately 32 groups are expected to benefit from the Seed project.

21. The ***Agricultural Research Corporation***, as the semi-autonomous official technical arm of the Sudan Ministry of Agriculture, is supporting the Seed Development Project as well as numerous other demonstration pilots for adaptation technologies. ARC is the authorized body for crop variety release and seed certification. They have significant expertise in developing and distributing adaptation technologies for land preparation, irrigation, rangeland

[4] http://www.cgap.org/blog/innovations-islamic-microfinance-small-farmers-sudan

and pasture improvement, plant nutrition, pest control, and agricultural engineering. In the context of the Seed Development Project, ARC is using its El Obeid-based research station in North Kardofan to conduct seed propagation and testing so that quality seed inputs are distributed and adopted by small holder traditional farmers. The primary role of the Agricultural Research Corporation (ARC) of Sudan is to assist the Extension Services with the adoption of sustainable, adaptation technologies through on-the-farm training.

22. The ***Shiekan Insurance and Reinsurance Co***., Ltd. has implemented insurance products for small holder rain-fed farmers and pastoralists since 2002. In view of catastrophic risks and the need for government support, Shiekan developed crop insurance for traditional farmers in 2002. They also have extensive understanding and capacity to provide livestock insurance. In fact, in 2011 Shiekan was able to provide crop and/or livestock insurance to 40,000 SRFP in Blue Nile, White Nile, North Kordofan, North Darfur, South Darfur and West Darfur states. Insurance products are currently marketed and distributed using Shiekan's network of 70 branches and offices throughout Sudan.

A. 5. Incremental /Additional cost reasoning: describe the incremental (GEF Trust Fund/NPIF) or additional (LDCF/SCCF) activities requested for GEF/LDCF/SCCF/NPIF financing and the associated global environmental benefits (GEF Trust Fund) or associated adaptation benefits (LDCF/SCCF) to be delivered by the project:

23. Outcome 1: Institutional and technical capacity for climate observation, forecasting and early warning strengthened at national and local levels

Without LDCF Intervention (baseline):

24. Regional early warning systems have been implemented in Sudan to produce alerts for food insecurity (by HAC and the Ministry of Agriculture) to notify residents when water is insufficient for irrigation or to notify humanitarian organizations when food aid is required. Such food security EWSs use agro-climatic data and are based on a partnership between the National Hydro-Meteorological Service (NHMS) and the Ministry of Agriculture. The NHMS also provide warnings regarding droughts and floods on national and regional levels such as to predict trans-boundary floods in the Horn of Africa.

25. Communication dissemination for early warning systems is currently housed at the Humanitarian Aid Commission (at the Ministry of Humanitarian Affairs), which provides overall coordination of post disaster aid distribution among the government and aid agencies. HAC's role is also to notify local populations (through NGO assistance) about epidemics, fires and emergencies and armed conflicts. The Office for the Coordination of Humanitarian Affairs (OCHA) is also engaged in emergency preparedness and response, involving government, international agencies and NGOs in developing contingency plans.

26. In spite of several EWSs being in place and various actors taking part in the process, none of the current systems have the robustness and the coordination needed for addressing looming food security threats and floods on a real-time basis; forecasts in themselves are not localized and have not been able to be accurate in detecting seasonal drought. Moreover, the EWSs do not operate effectively at the state and sub-national levels to serve the interests of local rain-fed farmers and pastoralists. Previously, SRFP in Sudan used indigenous forecasting methods to predict seasonal climate events. However, such traditional forecasting methods are not proving to be reliable with increasing climate variability.

27. Overall, the resources, including institutional functions, are scattered across many organizations; over 10 ministries and institutes are charged with varied responsibilities for disaster risk planning and management at federal and state levels for hazard monitoring, preparedness and ex-post aid coordination. Insufficient budgets have resulted in 162 silent rain gauges in the target states and an inability to renew model and satellite data licenses.

28. Independent reports have also verified the existing weaknesses of the early warning systems in Sudan. A study by Heynert (2006) detailed that several agencies produce their own ad-hoc flood forecasts, with often inconsistent results. A subsequent study by Michael Cawood & Associates continued on this observation and noted that after a flood forecast announcement, the tendency was to wait for assurance of this forecast by means of rising river levels before

taking action. This reduced the effective forecasting lead time by several days, preventing time for mobilization to implement risk-reducing measures (e.g., sand-bagging).

29. The following discussion details the capacities and needs of each NHMS separately. It also shows which projects have built or are building capacities within these institutions.

Ministry of Water Resources and Electricity

30. In terms of NHMS technical capacity, the Sudanese National Hydrological Service, the Ministry of Water Resources and Electricity (MoWRE) can provide several days of forecasting lead time for densely populated areas along the White and Blue Nile Rivers using the MIKEBASIN flood forecasting model. Additional lead time for forecasting on the Blue Nile can be provided using regional forecast and observed precipitation in the Ethiopian highlands.

31. MoWRE is responsible for operating and maintaining a surface hydrological monitoring network of 25 water level meters, 8 manual flow meters and 3 Acoustic Doppler Current Profiler (ADCP) flow meters. The equipment is used to validate flood forecasts. Paid observers take manual readings once a day at minimum. Data is sent daily, weekly and monthly via wireless telephone (GRPS) and transmitted to the MoWRE centre in Khartoum. An exception is reservoir level management for hydropower operations. MoWRE is currently capable of generating automatic alerts to the populations located around the dams through radio communication.

Table 1.Status of existing hydrological equipment under MoWRE

Station type	Existing	Fully operational
Water level (stage) measuring equipment	25	12
Manual flow meters	8	4
Acoustic Doppler Current Profiler (ADCP) flow meters	3	2
Hydrological stations	0	0

32. Baseline projects related to water resources are associated with the ***Eastern Nile Technical Regional Office (ENTRO***), a technical regional body supporting the implementation of ***Eastern Nile Subsidiary Action Program (ENSAP***). This program is funded by Riverside and UNESCO.

33. The overall programme is entitled, Design of an Upgraded Data Acquisition, Communication and Flood Forecasting System. ENTRO intends to provide Regional Flood Coordination in Addis Ababa to support flood forecasting and mitigation efforts in Ethiopia, Egypt, and Sudan and to facilitate data exchange between the three countries, all Eastern Nile States. Significant opportunity exists to improve the quality of forecasts in each of the Eastern Nile countries through acquisition and interchange of real-time hydrologic and meteorological data. These data can be transmitted to ENTRO/RFCU to be shared by the three national forecasting centres. The plan for this program includes 6 main actions including i) reviewing the river flood prone areas in Ethiopia and Sudan and flow forecasting needs at High Aswan Dam in Egypt, ii) designing the upgrade of the necessary hydro-meteorological data monitoring networks in Egypt, Ethiopia and Sudan required to support real time flood forecasting for these locations, iii) identifying other data sources such as weather data and satellite imagery from global sources to be used by the NFCs in Egypt, Ethiopia, and Sudan, and iv) designing the upgrade of the link between the national flood forecasting centres and ENTRO for data sharing.

34. The ENTRO project is located entirely along the main country rivers, including small portions of their flood plains (Annex 9b in the Project Document). The project site then does not include the rain-fed areas under the LDCF2 project. Also, the ENTRO project is focused on the design of the upgrade of the hydro-meteorological system rather than the actual implementation.

35. The ***Flood Preparedness and Early Warning Project, FPEW II*** is the second phase of one of ENTRO's fast track projects planned to support hydrologic forecasting and flood early warning in the Eastern Nile countries. The objective of the FPEW II project is to reduce human suffering caused by frequent flooding while preserving the environmental benefits of floods by improving flood plain management in urban centres and rural communities,

supporting operational flood forecasting through inter-country data exchange, improved emergency response by governments at all levels and community preparedness.

36. The ***IGAD-HYCOS*** project aims to establish a regional water management information system and to strengthen observation networks and their real-time data transmission within participating countries including Kenya, Uganda, Sudan, Ethiopia, Somalia, Eritrea and Djibouti and more recently South Sudan, Burundi and Rwanda. The overall objectives of the IGAD-HYCOS project are to promote sustainable and integrated water resources development and management in the IGAD region and enhance regional cooperation for the collection, analysis, dissemination and exchange of hydrological and hydro-meteorological data and information for water related decision making.

37. In spite of the technical capacity of MoWRE and project support to perform flood modelling along the Nile Rivers, a systematic arrangement for flood forecasting, warning and communication is not operational in Sudan and localized flood forecasts for vulnerable rain-fed farmers and pastoralists outside of the river flood plains are limited or non-existent. Most hydrological equipment is manual which prevents rapid warnings for inundation and flash floods from being generated and disseminated. Some flow gauges have been damaged during floods and others have been poorly maintained. At present, approximately 40% of the equipment is not functioning. Furthermore, although MoWRE has been trained by external experts during recent years over weekly increments, this limited training has not enabled them to make national coverage of flood or water management models fully operational. Finally, the annual operation and maintenance budget for MoWRE's hydrological network is limiting at USD 223,000.

Remote Sensing Authority

38. The Remote Sensing Authority (RSA) is responsible for establishing and maintaining natural resources geo-databases based on remote sensing data analysis and aided by field observation. RSA is also in charge of land cover mapping / land use change detection, focusing mainly on trend, impact and consequences of the changes. RSA uses digital geo- referenced Sudan land cover databases (e.g., LCCS, MadCAT and GeoVIS), including space technology (UNOOPS and UNSPIDER) for early warning of potential agricultural problems, disaster prevention and management, forest / rangelands / wildlife monitoring, production statistics and climate change assessment.

39. Most relevant to the LDCF2 project, RSA has the capability of estimating agricultural crop area measurement and crop yield estimations incorporating low resolution satellite data such as MODIS data for crop monitoring. With land cover and socio-economic information, they can also demarcate rangeland extent and livestock routes. Furthermore, they are capable of monitoring rainfall and the spatial extent of flash floods to assess the impact of floods on the agricultural crops using different indices product from MODIS satellite data. Similarly with NDVI and other similar indices, they can develop drought information using images of evapotranspiration and soil moisture. Currently, RSA is annually allocated USD 100,000 through Government budget lines.

40. RSA is currently being supported on-demand by the United Nations Office for Outer Space Affairs (UNOOSA). UNOOSA supports RSA to attend workshops and conferences and to participate efficiently in regional satellite/space data-related initiatives. Presently, Sudan uses space technology data for natural resources management, environmental monitoring and disaster management. Furthermore, Sudan hosted a UN – SPIDER Technical Support (TAS) workshop during 22 – 26 May 2011. The workshop was planned to be a first step towards "Institutional arrangements and coordination for RSA and six major institutes (Civil Defence, MoWRE, Ministry of Health, MoAg, SMA, HAC) to form a nucleus for risk assessment and disaster managements. The UN- SPIDER program offered its support for capacity building in Disaster Risk Management through a training course which took place in May 2013 for 20 participants. The training explored the available data sources and open source software that support climate forecasting and early warning.

41. Furthermore, RSA is currently being supported by the Global Monitoring for Food Security (GMFS) project funded by the European Space Agency. The goal of this project is to build capacity within the Ministry of Agriculture and its partners in the optimization of agricultural surveys by the use of satellite earth observation. Satellite images are used to produce cultivated maps and indicative maps of crop activities.

42. In spite of its capacity and project support, RSA lacks high enough resolution satellite images to generate accurate land cover uses and yield estimates. Furthermore, despite investment in computer equipment through existing projects, licenses needs to be renewed to be able to validate crop yields and generate early warnings for potential agricultural problems.

Sudan Meteorological Authority

43. The technical National Meteorological Service in Sudan is the Sudan Meteorological Authority (SMA) which is responsible for establishing and maintaining the national weather and climate observation network. They are responsible for data collection, analysis and exchange as well as the production of weather and climate information and products (including warnings) to support social and economic development.

44. Presently, the weather and climate observation network managed by the SMA includes 20 synoptic Automatic Weather Stations (AWS), 8 agro-meteorological AWS and 4 climate AWS as well as 186 rain gauges (see Table 2). Meteorological data is received on a daily basis (8 observations per day) and rainfall data is collected in the morning (once a day) during the rainy season at 0600 Z (0900 am LT). The stations are mainly located in the state capitals or other cities (See Annex 9c of the Project document). With a typical monitoring radius of 20 kilometres and only 1-3 stations located in each target state, more monitoring stations are required. Additionally, the network of volunteers manually reporting rainfall data in the field is in need of technical training on data transmission.

45. SMA's role is also to provide information on early warning on a daily basis as part of the regional climate outlook forum of ICPAC - Climate Prediction and Application Centre. As such, SMA produces agro-meteorological bulletins on a ten-day basis, with 3-7 day forecasts that mainly focus on drought and floods. SMA produces seasonal rainfall forecasts based on statistical models.

Table 2: Status of existing meteorological stations under the General Directorate on Meteorology in Sudan

Station type	Existing	Fully operational
Synoptic, manual	68	20
Synoptic, automatic	20	20 (being installed)
Agro-meteorological, manual	10	8
Agro-meteorological, automatic	10	8
Climate, manual	20 (all silent)	NA
Climate, automatic	4	4
Rainfall gauges	186	98
Radar	0	0
Radiosonde	3	0
Satellite receiving stations	2	2

46. For SMA, observation stations do not cover the spatial variability of the 5 different climate zones. Most existing stations are obsolete and in need of rehabilitation (with the exception of newly acquired stations acquired through the NAPA project). Also, as there is a shortage of modern and/or automated monitoring stations, data can be transmitted from existing weather/climate and hydrological stations only once a month. In the 6 targeted states: there are only 98 operating rain gauges. There are also 6 silent stations (synoptic and climate) and 162 silent rain gauges which need to be revived.

47. Furthermore, although the Sudan Institutional Capacity Programme: Food Security Information for Action (SIFSIA) project funded by FAO (2007-2010) built the capacity of SMA to have a downscaled, localized forecast called SAMIS, this programme was terminated at the end of 2012. Similarly, in 2010 the Meteorological Second Generation Satellite (MSG) was installed in SMA as part of the IGAD Climate Prediction and Application Centre (ICPAC) located in Nairobi under the project, AMESD, the African Monitoring of the Environment for Sustainable Development. AMESD had the obligation to provide required weather information to the Higher Council for Environment and Natural Resources (HCENR), the designated formal focal point for AMSED in Sudan. Upon completion, the PUMA project built off of AMESD project to make operational use of Earth Observation (EO) technologies and data for environmental and climate monitoring applications. However, at present, SMA does not have sufficient financial support to plan for the current phase of the African Monitoring of the Environment for Sustainable Development (AMESD) project, ***Global Monitoring of the Environment and Security Initiative for Africa*** (***GMES Africa***).

48. To overcome the insufficiencies of SMA, various on-going initiatives are trying to build satellite observation monitoring and forecasting capacities for both institutions. Relevant projects include the following:

49. SMA is currently self-financing the ***Vaisala*** project (USD 9 m, to be completed in 2013) by taking out a loan from a national bank. The project, being implemented by the Vaisala Company (Finland), is in the process of installing the following items:

- 30 AWSs, including 20 synoptic stations, 4 agro-meteorological stations, 2 marine stations and 4 climate stations where 28 stations of 30 will be installed at the key current operating stations and the remaining two (2) will be installed near Port Sudan Harbour for marine services. Forty (40) silent stations are required to be revived.
- 2 Upper Air stations (MW31 sounding system with GPS antenna).
- A Meteorological Information system.
- A Network and Communication Centre.

50. The ***Disaster Risk Reduction project*** (a baseline project discussed in Section A.4) plans on improving the EWS/CI in Sudan by the procurement of equipment, capacity building and implementing flood and drought risk reduction strategies at state and community levels. Similarly, the baseline project ***Food Security Policy and Strategy Capacity Building Programme*** (discussed in Section A.4) will address capacity gaps related to food security coordination, policy, budgeting and implementation capacity. Furthermore, a Finish Project- ***FISU*** (worth USD 513,000, to be completed in 2014) provided by the Finish Government aims to promote adaptation to climate change by reducing weather and climate-related losses through improved agro-meteorology services in Sudan. FISU addresses issues of sustainable development and peace-building by promoting North-South cooperation at the Sudan Meteorological Authority (SMA).

51. The Famine Early Warning Systems Network (***FEWS NET***) funded by the U.S. Agency for International Development (USAID) is an information system designed to identify problems in the food supply system that could potentially lead to famine or other food-insecure conditions. The FEWS NET data portal provides access to geo-spatial data, satellite image products, and derived data products in support of FEWS NET monitoring needs throughout the world. Sudan exploits FEWS NET products, such as IPC Version 2 by FEWS NET and is contributing to the Integrated Food Security Phase Classification (***IPC***) project (EU).

52. However, SMA is not currently contributing to or involved with the development of FEWS NET. In contrast, the Humanitarian Aid Commission (HAC) is working with FEWS NET to provide baseline information for livelihood zones, under a side project funded by USAID (USD 150,000, 2013-2014).

53. In spite of these on-going initiatives, SMA has limited ability to use of hydro-meteorological information for making early warning systems and long-term development plans for rain-fed farmers and pastoralists in the target States. Furthermore, relative to the LDCF2 project, SMA has limited ability to have reliable data, including long data time series, necessary for triggering pay-outs for Weather Index Insurance.

Overall needs and insufficiencies of Sudan's NHMS

54. Despite the support of the associated baseline projects and in-house expertise, the National Hydro-Meteorological Services (NHMS) lack sufficient hazard monitoring infrastructure e.g. rain-gauges, weather stations, weather radars, flow gauges and satellite imaging capacities. No spare parts and few manuals are available, in particular for automated equipment. Very little equipment if any is automated. Furthermore, knowledge on the implementation of modern weather, climate and hydrological forecasting is still required in Sudan.

55. Sudan also lacks effective dissemination and communication capacities. Normally the technical departments publish warning data on their websites or share it with HAC and other ministries. However, there is no formalized communication protocol between national departments and HAC for distribution.

With LDCF Intervention (adaptation alternative)

56. Despite the poor collaboration among various Early Warning Systems (EWS), if well consolidated, the current efforts in EWS provide a solid baseline for improved observation capacity, seasonal forecasting and early warnings which can be delivered in efficient and relevant manners.

57. Accurate and timely weather and climate information is a key component to developing successful index insurance products. By enabling a reliable stream of relevant data that permits private sector entities to price contracts and determine index values, claims can be settled quickly. By supporting continuous weather/climate monitoring, insurance companies can minimize their "basis risk" by being able to validate claims so that insurance pay-outs match actual losses. Similarly, banks offering index-based insurance schemes through their specific microfinance products will also be able to promote the sustainability of monitoring networks due to the utility of using weather/climate information to reduce risks, thereby increasing chances of loan repayment.

58. In order to build upon the existing NHMS knowledge and capacities on modelling, data analysis and forecasting within SMA, RSA and MoWRE, Component 1 will support drought and flood forecasting in addition to land cover/crop monitoring. RSA and MoWRE will receive equipment, high resolution satellite images and training to better simulate localized flood forecasts. Similarly, synoptic and climatic weather stations will be procured to assist SMA in drought forecasting and early warning. All information production agencies will receive training on equipment operation and maintenance and modelling as well as training to budget O&M costs in the future. The project will furthermore facilitate the validation of land cover satellite images and equipment monitoring in the field for all agencies. It will also promote data rescue so that more extensive weather/climate databases (longer time series) can be created. Such an approach will serve to support the continual verification and updates of weather indices used in weather-index based insurance.

59. SMA, RSA, MoWRE will also be supported to provide sustainable climate/weather services. SMA previously produced SAMIS forecasts combining rainfall and NDVI images to determine the onset of the growing season at national and state levels. In spite of their accuracy and localized information, production of SAMIS bulletins was terminated at the end of 2012 due to limited funding. As such, LDCF funds will enable SMA to revitalize and improve their targeted localized, SAMIS weather forecasts. Similarly, LDCF funds will support RSA to establish a farm management system in order to provide baseline crop and crop simulation information. Furthermore, SMA/RSA will gain expertise in predicting the onset of rains. As indicated in Stakeholder consultations during project development, such a prediction is of greatest interest to pastoralists because migration patterns depend on when grass and water are available (rather than average rainfall available over a certain period).

60. Finally, LDCF funds will be used to improve communication and data sharing among climate risk finance Stakeholders. As Stakeholder consultations indicated that there is limited coordination between information production agencies, a cloud data server will be purchased and developed so that technical information production agencies can share weather/climate/crop/land cover information with the Ministries of Agriculture and Livestock, the Humanitarian Aid Commission (HAC), MFIs, insurance companies, specific NGOs and extension services. The aim of improving data sharing will be to facilitate the generation of targeted information. Similarly, by coordinating with existing communication protocols, the LDCF2 project will work to facilitate the feedback of SRFPs to enhance advisories and record recommendations.

61. To enhance communication of weather/climate and agricultural information, a mobile phone partnership will be developed in the last two years of the project. Through this development, SMA/ARC will be able to provide weather/agricultural advisories by SMS to SRFPs. In order to determine the costs and benefits of forecast/advisory services, periodic rapid surveys of targeted users (SRFPs) will be conducted.

62. Specifically. LDCF2 funds will build on the above mentioned baseline projects (See Section A.4) in the following manner:

- Work with the National Early Warning Committee to be established in the ***Disaster Risk Reduction project*** (DRR) to enhance the utility and efficacy of forecast/advisories. The LDCF2 project will build on the training for SMA, MoWRE and RSA on new technologies and data interpretation provided by the DRR project. The LDCF2 project will also exploit the SOPs on EWS dissemination prepared under DRR. The LDCF2 project will also build on the equipment acquisitions of the DRR project, ensuring that new equipment is placed in complementary locations. (New equipment from the DRR project will include warning dissemination equipment for HAC and Civil Defence offices and a computer cluster for SMA to perform weather analysis, forecasting and climate predictions.)
- Build upon the equipment acquisitions self-financed by SMA in the ***Vaisala*** project.
- Build on the ***Food Security Policy and Strategy Capacity Building Programme*** (FSPS) project by collaborating with the Ministry of Agriculture to integrate weather/climate information into food security policies and enhance the current ability of NHMS ministries to plan long-term budgeting.

- Build upon the remote sensing capabilities of RSA provided by ***UNOOSA*** and ***UNSPIDER*** initiatives and the former ***AMESD*** and ***PUMA*** initiatives.
- Use private sector investments and Government budget lines provided by micro-finance and insurance to support weather/climate monitoring in the long-term. This will complement the ***SISFIA*** programme which tailors its forecasts for aid planning in response to major disasters.
- Build on the ***IGAD-HYCOS project*** and the ***ENTRO*** programme by procuring and rehabilitating complementary equipment / stations and facilitating flood-based data sharing across sectors in Sudan.
- Continue exploiting and contributing to the ***FEWS NET*** data portal such as by providing more detailed risk and crop yield maps to be generated by RSA under the LDCF2 project.

Outcome 2: Residual climate risk to rural livelihoods in the states of greatest rainfall variability addressed through parametric insurance products.

Without LDCF Intervention (baseline):

63. Insurance is a particularly well developed industry in Sudan. Livestock insurance in Sudan commenced in the 1960s. The first Sharia-compliant (takaful) insurance company was established in 1979. Since these developments, in 2002, the Central Bank of Sudan and the insurance sector were subject to major reforms upon when the country introduced the Basel requirements for the banking sector and aligned them with Sharia principles. Only relatively recently in 2002/2003, in view of catastrophic risks and the need for government support, crop insurance was developed by the Shiekan Insurance and Reinsurance Company in Sudan.

64. In spite of the numerous years of experience in traditional insurance schemes, there is a full recognition of limitations in the current system particularly with reference to covering risks related to increased climate variability. Smallholder rain-fed farmers and pastoralists (SRFP) are very rarely covered under existing insurance schemes. For example, as seen by the list of products and whom they are covering below, it is clear that SRFPs are limited in their insurance options.

- Existing agriculture insurance products:
    - Multiple Peril Crop Insurance (MPCI).
    - The Crop Insurance Policies includes:
        1. Irrigated crop insurance policy
        2. Rain fed crop insurance policy
        3. Horticultural crops insurance policy
        4. Forest crop insurance policy
        5. Greenhouses insurance policy
        6. Sugar cane insurance policy
- Clients covered:
    - Large scale semi mechanized rain fed producers and companies.
    - Irrigated small acreage farmers. (gravity irrigation)
    - Horticultural tree gardens
    - Small farmers in rain fed zone of more than 450 mm per annum linked with financial credit
    - Producers societies and cooperatives

65. Based on this list, insurance companies are quite selective in choosing which SRFP are insurable. At present, SRFP need to receive more than 450 mm of rainfall per year to be insurable. However, in reality, SRFP in the plains of the River Nile State and the northern portions of North Kordofan, White Nile, Gedarif and Kassala states can receive

less rainfall than 450 mm due to rainfall variability. In this case, SRFPs cannot access to insurance services to help build resilience to extreme events.

66. One of the underlying causes is that insurance companies are reluctant to cover high risk clients (i.e., SRFP) with existing insurance products. Experience of the insurance sector during the 2000 drought reinforced this reluctance when companies saw a 103% loss ratio for livestock insurance schemes due to high rates of claims submitted. Furthermore, in spite of the high potential for agricultural insurance in Sudan, evidenced by steady growth in insurance coverage, transaction costs for SRFP remain too high. Transaction costs are expected to increase as climate related risks become more prevalent in scale and intensity. Insurance products are costly at present because 7% of the sum ensured must cover the insurance premium. There is also an unavailability of insurance agents in rural areas to deliver services and build awareness on insurance products due to the remoteness of rural populations.

67. For pastoralist production systems, the situation is particularly challenging. At present, re-insurance companies do not accept insuring livestock in open grazing lands. This leaves most nomadic pastoralists without any access to insurance or bundled MF/MI services.

68. Another issue lies within the slow product approval process by the Internal Sharia compliant committee which may take up to 4 months to approve a loan product before it is submitted to the Insurance Supervisory Authority for final approval. Also, the window in which farmers/pastoralists are able to report damage/losses is often so limited and the distances so long to reach Khartoum-based insurance companies that many claims are left unreported.

69. Furthermore, insurance companies do not have knowledge on how to develop new products targeting SRFP. Stakeholder consultations with insurance companies indicated that they are interested in piloting Weather Index Insurance. However, as climate risks vary from one state to another, the development and adaptation over time of weather indices used to judge pay-outs is complex.

70. The primary challenge with developing WII is how to establish the index. Events must be verifiable by high resolution satellite images or nearby weather station readings. For Weather Index Insurance, a long and high quality time series of meteorological data is required (approximately 30 years of uninterrupted data collection, automatic preferred). If station data is not available or in conjunction with station data, satellite data is more often used. The satellite data must be sufficiently down-scaled and accessible over long time periods. Piloting Weather Index Insurance requires reliable weather data observed fairly close to the locations of the farmer's risk exposure.

71. A secondary challenge is to ensure that good inputs are provided to farmers/pastoralists so that their productivity can be increased. In addition, extension services providing targeted and tested farming advice must be made available to farmers in order to boost their productivity. In fact, weather-risk management is enhanced when combined with properly functioning input and output markets, good governance in the management of strategic grain reserves, and adequate smallholder productivity.[5]

72. The third challenge is to cover the high upfront costs over the long-term. In theory, high upfront costs in developing WII will be minimized over time because administrator fees to perform individual loss assessments are not required with index insurance. By linking MF with WII, such costs can be minimized when adaptation packages are adopted enabling yields to increase as a result. As loans are more easily repaid, optimal inputs can be purchased further increasing productivity. Subsequently, as MF/WII products demonstrate their success more SRFP will be incentivized to enter such schemes. By creating economies of scale, the costs of MF/WII products can decrease over time.

73. An existing baseline initiative, ***Connecting Farmers to Market*** project, has managed to provide microfinance and micro-insurance to SRFP on a large scale (see Section A.4). However, Stakeholder consultations in the field noted that compensation criteria are not clear under this traditional micro-insurance scheme. As a result, an increasing number of SRFP are opting to not use insurance.

74. Consequently, there are limited insurance services provided to SRFP which can be used to address residual risks inherent to agricultural and livestock production (Shiekan Insurance and Al-Tawania being the main active insurance agencies). Insurance coverage is enjoyed only by the wealthier segment of the agricultural sector, bypassing the most vulnerable farmers and pastoralists engaged in rain-fed agriculture and pastoralism.

[5] See MicroEnsure Feasibility Study (Annex 8 in the Project Document)

With LDCF Intervention (adaptation alternative)

75. Project Component 2 will focus on developing index insurance for climate risk management in the states of high rainfall variability where certain residual risks remain, even after adaptation measures are adopted (e.g., LDCF1 project). Weather Index Insurance (WII) is a finance mechanism which can be designed to address highly covariate climate risks (such as prolonged droughts and severe floods).

76. WII has been proposed as a new climate risk management tool to help people cope with weather/climate related-risks for a variety of reasons. In theory, product design is straightforward: a contract is written against an index establishing a relationship between lack of rainfall and crop failure, verified by long historical records of both rainfall and yields. Farmers collect an immediate pay-out if the index reaches a certain measure or "trigger," regardless of actual losses. Such an approach gives farmers an incentive to make productive management decisions.

77. As a result, the attraction of WII is that once developed, index insurance is less expensive to administer because on-site inspections and individual loss assessments are not required. Compensation becomes objective because farmer's cannot influence a claim (dependent on the efficacy of the index). Furthermore, the independently verifiable index enables reinsurance and facilitates insurance companies to transfer part of their risk to international markets.

78. By insuring against spatially correlated weather risks, WII facilitates the access of SRFP to financial instruments such as microfinance and savings. By developing tailored Weather Index Insurance products, local finance for adaptation can be unlocked by safeguarding loans against climate risks and thus making micro-finance services available to the most climate risk exposed rural communities that otherwise would have been considered too high risk to have access to financial services. Insurance thus enables SRFP to better protect themselves against weather risks and when linked with credit, can facilitate the diversification of activities to build resilience (e.g., purchase of more drought resistant seeds). Moreover, if properly designed, WII can mitigate food security shocks by serving as a source of emergency financing when area-wide drought/flood catastrophes take place.

79. In order to conquer the aforementioned challenges in developing WII, Component 2 will focus on the development and pilot testing of 6 Weather Index Insurance (WII) products in the different livelihood zones of each project State with the assistance of the Shiekan Insurance and Reinsurance Company and the Al-Tawania Insurance Company. Shiekan can provide lessons learned on how to best implement aspects related to crop and livestock insurance while Al-Tawania, due to its experience in the Connecting Farmers to Market project, can recommend how to best manage a micro-insurance scheme.

80. To begin with development of WII, a field study on how to improve input delivery, value chains and lending services will be conducted. The study will focus on how to best link inputs, extension services and credit with WII so that agricultural/livestock production can be maximized. Also, LDCF funds will be used to sponsor a study tour of a functional WII market in a developing, Islamic country. Based on these studies, the legal and regulatory framework for risk transfer will be analysed so that policies can be adapted and reinsurance secured. Policies must also be revised so that clear compensation criteria can be developed based on best practices to monitor and validate weather indices in each state. A formalized partnership with the Connecting Farmers to Market project (and thereby their experiences with micro-insurance) will assist with collecting and integrating lessons learned to develop revised criteria. Regulators and policy makers will be trained on these new policies so that they can implement the regulatory scheme for WII. The internal Sharia Committee will be trained on WII in order to expedite the current, lengthy loan approval processes.

81. In developing the weather-based indices, each climate zone and the particular economic and social characteristics of the target populations will be analysed. In cases where no weather station data is available, satellite data will be used. In addition, consultations with local populations will be conducted so that climate/weather trends and drought/flood impacts in each target region can be fully understood. Particular attention will be paid to creating an index which is adaptable to various regions so that it can be easily scaled-up and high upfront development costs can be recovered. A pre-feasibility study by MicroEnsure (Annex 8 in the Project Document) indicated that the ranking of droughts in terms of severity matched the TAMSAT satellite database.[6] As such, the purchase of TAMSAT products will be supported by LDCF funds to serve to validate triggers for index based payments. Further assessments during project implementation are required to assess how accurate TAMSAT is for the targeted areas.

[6] MicroEnsure Feasibility Study (Annex 8)

82. Based on the pre-feasibility study conducted by MicroEnsure during project development (See Annex 8 in the Project Document), initial screening indicated that the application of a Weather Index Insurance (WII) product is appropriate in Sudan because drought/flood risks are spatially correlated. In other words, villages within the same region are subject to the same weather/climate conditions. Consequently, the basis risk is low because an index can be determined to judge losses for the same region.

83. The pre-feasibility study established that approximately 1% of subsistence farmers, 10% of mixed crop farmers (i.e., those who cultivate cash crops and subsistence crops) and 2% contract farming ((i.e., those that are supported by a delivery agent who provides seed and farming guidance in return for cultivated crops) can be targeted by WII products in the 6 target states. In total, approximately 45,000 farmers are likely to be covered by the WII products. However, it should be noted that the study was unable to indicate how many pastoralists can be targeted because WII has not yet had success for pastoralists in developing countries where generally pastoralists hold on to their livestock for security. An additional study is therefore required to determine the demand of pastoralists for WII (See Output 2.3, Activity 2.3.1).

84. During the development of WII products, time and resources will be invested in explaining how they work (particularly focusing on costs and benefits, risks and opportunities). The LDCF2 project will support extensive training series for the beneficiaries to raise their awareness and financial literacy as well as to cultivate trust in this new financial product for climate risk management. Specialized biannual training sessions will be organized for the MFIs to cover the main elements of index-insurance such as (i) indemnity payments under the contract; (ii) a payoff structure that defines the relationship between the index and indemnity payments; (iii) basis risk; and (iv) low cost index insurance deployment models.

85. The project also includes the development of a nationally based WII product development team who will be able to facilitate insurance outreach and improvements for WII products. The team can include insurance experts seconded from Al-Tawani or Shiekan so that the capacity of nationally-based insurance providers will be reinforced. The role of the team will be to train farmers and pastoralists (including trade unions and extension services) as well as banks, MFIs, NGOs and insurance companies. Simultaneously, they will obtain feedback from farmers and pastoralists and conduct Monitoring and Evaluation of products on-site. Ample budget and time have been allotted for the national based WII development team (with assistance from an international WII development firm) to obtain feedback from rain-fed farmers and pastoralists so that products can be improved.

86. Product development and pilot testing will occur in a staggered manner (1 product developed in the first year, 2 products during the second and third years and 1 product in the fourth year). Such an approach will provide time for the WII developers to target the WII products to the livelihood needs and to incorporate lessons learned from previous WII pilot trials. See Weather Index Insurance Stakeholder map (MicroEnsure Feasibility Study, Annex 8 in the Project Document).

87. Furthermore, throughout the implementation stage, the project will need to host a series of workshops where staff members undergo training, (branch managers and agri-business managers). Banks and MFIs will also play a participatory role in the design of bundled loan and WII products. Banks and MFIs could become clients that purchase Weather Index Insurance on behalf of farmers and pastoralists.

88. Significant budget will also be included to train insurance companies such as Shiekan Insurance and Reinsurance Company and Al-Tawania Insurance Company so that they can adapt the products based on any updates to weather station, satellite and/or new crop data. Training (including a Study Tour) will be provided to the nationally-based insurers and brokers so that they can underwrite Weather Index based Insurance, conduct a public awareness campaign on the utility and importance of agricultural insurance services for SRFP and assist in the development of presentations and brochures. To improve outreach to rural regions, LDCF funds will be used to increase the number of market outlets and insurance agents and to develop mobile banking/insurance services.

89. Also, an outreach strategy and training syllabus will be created for WII so that Training of Trainers (TOTs) can take place in each state (e.g., TOTs are likely to include 4 regional insurance agents and NGO representatives). The TOTs will then train cooperatives, farmer/pastoral trade unions, extension services and group leaders on WII.

90. Using group leaders for insurance product training has advantages: group leaders are often more literate and numerate than other members of the group so they may be able to understand the products quickly in a training session and can then communicate the key concepts effectively to other members. By vouching for the insurance products, they can increase trust in the insurance products among other members of the group.

91. The LDCF2 project will furthermore support an increase in the number of insurance/financial service market outlets including mobile units so that SRFPs in remote areas can be reached and have access to climate risk financial services. The project will also support an improved relation between the banks/MFIs and input suppliers. This will be in the form of creating farm input packages, where the farmers receive their loan in the form of seeds, fertilizers and pesticides. Such an approach was shown to be a success in other developing Islamic developing countries who have adopted WII products[7].

92. Similarly, the project will promote collaboration between the Ministry of Agriculture and the MFIs/insurance companies. The Ministry of Agriculture's (MoAg) agri-extension officers will be used to conduct effective marketing and training programmes to farmers. The project will also work in collaboration with the MoAg on national and state levels because as evidence has shown, the MoAg could become a key developer for Weather Index Insurance when used for food security[8].

93. Overall, WII has the potential to protect food security on both macro and micro levels. On a macro level, the Government will be able to mitigate the financial consequences of a food security shock by purchasing an area-wide product that could generate a supplemental source of emergency financing to support existing resources at the country level. Distinct advantages that can be achieved through index-based ex-ante financing include; immediate cash payment, structured rules for payment, improved correlation between need and provision, flexibility of cash payments, risk assessment and mitigation and targeted assistance to problem areas. On a micro level, farmers and pastoralists will be able to purchase Weather Index Insurance as part of a credit-enabling package, which will allow them to access a loan to purchase high quality agricultural inputs. This leads to increased productivity and additional income for farmers, allowing them to diversify their economic activities and better protect themselves against weather risks (for example, increased income could lead to purchasing irrigation equipment). In the event of a weather shock, farmers and pastoralists will be able to quickly receive cash and, depending on the season, will be able to purchase new inputs or food produce and household goods directly.

94. In the long-term, relief agencies can link up with the index-insurance scheme and select a weather-based index that can effectively serve as an early or lead indicator of an emerging crisis. This will help avoid the usual delays incurred when relief agencies must first demonstrate an emergency and then appeal for donations from governments and donors. In case of disasters of catastrophic scale, timely mobilized relief funds and government resources from Sudan's Social Fund can provide hedging for the insurance.

95. To support WII development. LDCF2 funds will build on baseline projects (discussed in Section A.4) in the following manner:

- LDCF2 funds will build off of lessons learned in the traditional micro-insurance scheme implemented by the Connecting Farmers to Market project. Lessons which will be incorporated into the LDCF2 project include detailing which compensation criteria are not clear, how to develop better outreach mechanisms and target different crops as well as how to effectively distribute insurance in the case of common states. A formalized partnership will also be built between the LDCF2 and Connecting Farmers to Market project (Activity 2.2.6).
- LDCF funds will also build off of Shiekan's experience in providing multiple peril crop insurance and livestock products to small holder rain-fed farmers and pastoralists. Shiekan has extensive understanding and capacity to carry risk as demonstrated by their ability to provide insurance to 40,000 SRFP in Blue Nile, White Nile, North Kordofan, North Darfur, South Darfur and West Darfur states in 2011. The LDCF2 project will build the capacity of Shiekan's personnel to understand and manage new Weather Index based Insurance products by training insurance agents in each state. The products will be marketed and distributed using Shiekan's existing network of branches and offices as well as the additional rural outlets to be developed in the LDCF2 project.

Outcome 3: Efficient and effective use of hydro-meteorological and environmental information for making early warnings and seasonal forecasts which feed into long-term development plans

Without LDCF Intervention (baseline):

[7] http://www.cgap.org/blog/reaching-small-farmers-through-innovative-finance-pakistan
[8] MicroEnsure report

96. Microfinance cooperatives, CBOs and specialized banks have been in existence for several decades in Sudan (the Savings and Social Development Bank of Sudan (SSDB) developed guidelines for the implementation of MF in 1974). Since the mid 1970's, the Agricultural Bank of Sudan (ABS) has been working with rural poor communities in remote areas through cooperation with international development agencies. ABS partnerships with IFAD in the traditional rain-fed sector started in the 1980's through the En Nahud Cooperatives Development Project. Since then, ABS has established credit linkages with community managed financial intermediaries including sanduqs, village development committees (VDCs), and savings and lending groups. Through these partnerships ABS has been exposed to a diversity of rural financial markets, has developed an understanding of the type of products and services needed and has applied group guarantee systems.

97. Recently, the MF sector was revitalized in 2006-2007 when the Government of Sudan endorsed MF as a central element of its financial policies to support poverty reduction. In 2006, as a follow-up to this policy direction, the Central Bank of Sudan (CBOS) commissioned a situation analysis study on MF in which it formulated a strategy to develop and promote the MF sector in Sudan. The strategy "A Vision for the Development and Expansion of the MF Sector in Sudan" was implemented between 2007 and 2010. The strategy's goal was to: "facilitate sustained access to financial services for the economically active poor in rural, semi-urban and urban areas by expanding and developing the microfinance sector in a cost-effective, gender sensitive and sustainable manner."

98. Effectively, in 2007, the Microfinance Unit at the Central Bank of Sudan was established and is presently responsible for executing CBOS strategy to develop social and economic banking in urban and rural areas through MF with the aim of eliminating poverty and increasing economic development according to the Comprehensive Peace Agreement (CPA). The unit has issued several directives to banks to deliver microfinance services so as to increase the extension of financial services to the economically active poor. The most influential directive has been to mandate banks to allocate 12% of their annual lending portfolios to microfinance. Of this 12%, 70% should be allocated to rural areas for financing crop production, livestock production, fisheries and non-agricultural activities. As of 2012, total resources allocated to MF by the CBOS totaled SDG 350m with total expenditures of SDG 272m spread over investments to i) build capacity in Sudanese development banks, ii) empower rural women in association with the Ministry of Social Welfare (SDG 74m) and iii) co-finance with Islamic Development Banks for MF institutions (SDG 10.5m).[9] The low utilization of microfinance resources has been due to the fact that the commercial banks consider microfinance not profitable due to high transaction costs. Banks are also reluctant to engage with Microfinance Institutes (MFIs) which have weak capacities to manage loans.

99. To facilitate CBOS fund distribution and develop the microfinance sector, the Government supported the establishment of the Sudanese Microfinance Development Facility. Recently, SMDF became a private entity and is now known as the Sudanese Microfinance Development Cooperation (SMDC). The mission of SMDC is to ensure outreach to microfinance through strengthening the technical and financial capacities of the MFIs, linking their programs with Sudan's macroeconomic policies and priorities. Currently, SMDC is overseeing the activities of the Connecting Farmer's to Market project through a project coordinator who is guiding the central technical committee and supervising the work of state committees. SMDC's role is also to provide flexible and carefully-designed financing to qualified, high-potential microfinance institutions for institution-building, systems development, and on-lending. Both existing microfinance operations as well as start-ups are eligible for funding. Presently, all funding is provided by the CBOS, but SMDC plans to work with international donors to establish more credit lines.

100. As evidenced by the CBOS budget for MF, there is a plentiful supply of cheap capital for MF lending which is largely under-utilized by the majority of the rural population who is dependent on natural resources. (Microfinance in Sudan is largely supply-driven and government-subsidized).

101. To date, only a small portion of this amount has reached the people most in need, due to a persistent tendency of not providing loans to groups which are perceived as 'high risk'. As a result, microfinance service provisions are very limited for rain-fed communities with the exception of a few NGOs and CBOs that provide retail microfinance. Moreover, agriculture input financing through loans and micro-credits is very rare.

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1. [9] Sudan's MF sector is governed by the Islamic banking system. Through this system, called Shariah, banks cannot charge interest. Rather they can obtain a profit margin from selling crops. In this system, the farmers/pastoralists do not give back money but provide in-kind payments (e.g., selling the crop). In Sudan, the Islamic Development Bank is taking an active role in capacity building for MF intermediaries to setup an inclusive MF Sharia'a compatible system in favour of MFIs.

102. According to the UNDP and the Policy Assessment, Consultancy and Training (PACT) national assessment on MF in June 2012, ***Mapping, Capacity Assessment and Capacity Development of Microfinance Providers in Sudan,*** capacities for Value Chain Analysis are lacking and capacity of Microfinance service providers, particularly banks, in the development of products is weak in Sudan. The main products for banks are traditional credit products. These products are generalized to all clients and do not fully consider the nature and type of activities. Also in terms of technology most of the banks rely on traditional core banking systems, which do not have the ability to access the poor who are generally located in remote areas. Furthermore, training programs are also limited, and extension and Business Development Services (BDSs) require massive capacity building.

103. One of the biggest challenges is that MF products and services from formal providers are not customized to suit the needs of targeted local communities, thus giving an advantage to informal providers. Also, there is no legal framework in the area of non-traditional guarantees and inexperience in working with complementary micro-financing services (i.e., savings and insurance).

104. Furthermore, knowledge and capacities are missing at the MFIs, NGOs and insurance companies to develop and deliver coupled micro-finance/micro-insurance schemes. There is currently limited awareness on how insurance can be used to address residual climate risks when complemented with microfinance. As a result, there is little public funding available for feasibility assessments, capacity building and product development.

105. Stakeholder consultations in the 6 target states indicated that rural populations limit taking out loans from MFIs due to lack of collateral and lack of knowledge/understanding on the bureaucratic procedures and regulations. They also found that the existing products were not flexible during periods when no income could be gained (e.g., planting period).

106. Another issue is that MF is not linked with adaptation technologies which have been proven to improve productivity and increase resilience to extreme weather for SRFP. In fact, micro-finance and adaptation technologies can be seen to go hand-in-hand. Access to micro-finance enables rain-fed farmers and pastoralists to purchase the equipment which can help build their resilience to climate change (e.g., rainwater harvesting equipment, more drought-tolerant seeds). At the same time, by using technologies which are more climate-resilient, farmers and pastoralists are more likely to not default on their loan repayments.

107. Development of MF in Sudan is also polarized. Within Sudan there are formal and informal MF services. Loans from informal lending sources (Shail system) are widely spread. This is an old practice whereby small holders sell part of their expected crops to agricultural crop traders (known as Salam in Islamic banking). This informal system is flexible in terms of adapting to local circumstances which suit the farmers/pastoralists in terms of product, amount, timing, coverage and loan non-repayment. An example of informal lending flexibility was provided in the PACT assessment where 75% of informal cases in a study sample showed some sort of personal guarantee rather than real collateral being promised.

108. There are over 6 million potential microfinance customers in Sudan, yet the number of current clients is approximately 400,000. Most of the microfinance service providers are concentrated in states with lower poverty rates and few are located in rural areas. Of the total 400,000 microfinance clients covered in the year 2012, only around 93,000 i.e. 23% were rural clients. The rural clients covered represent around 6% of the rural and nomadic households of the project area excluding the River Nile State. Therefore, rural area microfinance is a relatively untapped market in Sudan.

109. As shown in Table 3 approximately 55% of rural clients in 2012 were served by Agricultural Bank of Sudan (ABS) branches and the ABS Microfinance Initiative. This is no coincidence because lending to farming and livestock production is mandatory for ABS. The remaining farmers/pastoralists were served and continued to be served by the CBOS microfinance programme, ***Connecting Farmers to Market*** (See Section A.4).

Table 3: Number of rural farmers in the 6 target states engaged in microfinance during 2012

Household Population of the project area		
Banks	**No of clients**	**% of Total**
The Agricultural Bank of Sudan	36,637	39%

The Savings and Social Development Bank	0	0%
The Farmers Commercial Bank	0	0%
Bank of Khartoum	19,000	20%
The Sudanese Rural Development Company	8,200	9%
Kassala Social Development Fund	14,873	16%
The Agricultural Bank of Sudan Microfinance Initiative (ABSUMI)	14,972	16%
Total	**93,682**	**100%**

With LDCF Intervention (adaptation alternative)

110. To improve productivity and increase climate resilience of SRFP, Component 3 will focus on the development of at least 6 adaptation packages linked with MF services in each target region. To develop the packages, lessons learned from adaptation technology applications by Farmer's Field Schools will be documented. The technologies will then be validated on-farm whereby they must show an increase in sustainable crop and livestock production and incorporation of local knowledge on appropriate agricultural/livestock practices in order to be deemed acceptable.

111. The ARC and Extension Departments will jointly be responsible for delivering adaptation technologies. Accordingly, the project will support the Agricultural Research Corporation (ARC) and the Agricultural Extension Departments in the respective states to test and spread adaptation technologies including for dry-land adaptation for pastoralists. On the national level, 163 researchers and Agricultural Extension officers will receive training, including 14 women. On the state levels, the following number of researchers and Agricultural Extension officers will be trained: Kasala; 5, Gedarif 6, River Nile: 20, White Nile: 3, North Kordofan: 15 and South Darfur: 4. The Project will support ARC and Extension Departments in each state to establish demonstration farms to exhibits the best practices of adaptation technologies for both crop and livestock production. These demonstration farms will be combined with Famers Field Schools. The ARC through its Agricultural Socio-Economic Experts Cadre will ensure that adaptation technologies delivered are economically viable and socially acceptable. In order to effectively disseminate the adaptation technologies to rain-fed farmers and pastoralists, technical manuals detailing sustainable agricultural and pastoral activities for year-round cultivation and production of milk/meat products will be prepared and distributed by ARC.

112. Simultaneously, at least 3 microfinance, flexible loan products will be designed and pilot tested to account for pastoral mobility and seasonal income cycles of local farmers. To ensure the products will be accessible to SRFPs, loan conditions and regulations among MF providers will be unified ensuring flexible terms. Similarly, the adoption of climate change adaptation technologies will be mandated as a pre-requisite for obtaining access to credit/insurance services.

113. In order to disseminate the MF products, mobile banking, pastoral GPS tracking and mobile-phone advisory services will be developed. Also, Agricultural Extension and Technology Transfer Administrations (AETTA) and Training of Trainers (TOTs) will receive capacity development on how to organize SRFPs and train lead farming/pastoral focal points. A financial services manual will be designed for SRFPs to build their financial literacy on conditions for micro-credit access, credit by-laws, loan/insurance/savings products and repayment schedules. Subsequently, SRFPs will be organized and trained by lead farmers, farmer/pastoral trade unions and Farmer Field Schools in order to facilitate their access to extension services, adaptation technologies and MF/MI services.

114. In order to provide incentives to banks to provide MF services to SRFP, they will be organized into groups so that they can have collective collateral. NGOs will serve to assist with the organization of SRFP.

115. The cornerstone of this project will be to effectively link MF products with the tested WII product(s) developed in Component 2. As a WII product has never been successfully introduced in Sudan, MFIs and banks will receive significant training on how to pair MF and MI services together. At the same time, regulatory processes will be streamlined so that loan repayments become more efficient.

116. The role of micro-finance in delivering index insurance is significant, either through the banks and their micro-finance facilities or community funds – sanduqs. Without bundling insurance with credit, many farmers will lack both the capital to pay the insurance premium and sufficient incentive to use scarce resources to buy risk coverage. Placing insurance products within complementary systems with broader linkages can also facilitate simpler contract design, as other mechanisms which can deal more efficiently with the subtle aspects of risk and crop losses that cannot be indexed.

117. Therefore, establishing the linkages between farmers, insurance and credit providers will be critical for the success of the refined scheme. When lenders know that borrowers are covered by insurance, they will more likely extend credit to them opening the opportunities for rural populations to make investments that may raise their productivity, especially if the latter is incentivized by the insurance scheme as part of the requisite climate risk management conditionality spelled out in the contracts. In package, together with index insurance, MFIs become more willing to take risks and give loans to the most vulnerable SRFP for agriculture inputs.

Pastoral Production Systems and Microfinance

118. Sudanese lenders have an unexplored, potential market with pastoral production systems. Dryland pastoral/nomadic livestock production systems are unique in their ability to take advantage of ecosystems where unpredictable variability is a characterizing feature. As global climate change is increasing extreme weather variability, dryland livestock production systems can be considered increasingly valuable because of their capacity to turn environmental instability into an economic asset.[10]

119. In fact, the economic value of the livestock sector includes various activities other than animal production, such as the production of livestock dung for fuel, the use of animal power in agriculture and transport and the value of livestock's financial services such as savings and investment, credit, insurance and risk pooling. Pastoralists very frequently use their livestock for risk pooling. Numerous rural people make their living along the livestock value chain including primary producers, trade operators, transporters and drovers, hides and meat processers, feedlots, and markets in water and fodder. Women also have important roles in pastoralist societies, from rearing the livestock kept at the camp (e.g., goats and young animals) to fetching water and firewood. In total, it has been estimated that there are at least 2.7 million nomadic herders making their livelihoods off pastoral production systems in Sudan. This figure is likely to be much bigger (perhaps 4 times bigger) because there are many additional households using subsistence services and other economic services from pastoral livestock.

120. In spite of the prevalence and benefits of pastoralist production systems and value chain activities, if not supported, pastoral systems will continue pulling out of the mobile production system, tending to compete for scarce land for farming or be lured into the unsustainable gold mining industry. In Sudan, with each generation, between 15 and 25 percent of pastoralists leave the production system because they are lured to cities or to get "rich quick" in the gold industry. This trend has been exacerbated by the fact that, at present, there is a transfer of productive livestock towards management systems that offer the highest returns, so called 'investment marketing'. The result is that there is an increasing gap between wealthy and poor within pastoral groups. The consequences are dire including the loss of expert knowledge and a poor understanding of specialized dry-land animal production. These losses are exacerbated by the commercialization of capital stock which has opened up the system to outside investors and absentee owners with little or no ties within the pastoral society.

121. In order to support pastoralism, there is a need to provide capital to pastoralists in order to deal with rising costs of production, including the costs of feeding, watering and moving animals. These costs are becoming an increasingly heavy burden on less secure pastoralist households, particularly those in poverty who are faced with epidemics or drought spells.

122. Indeed, microfinance can be used to support the rising costs of water and crop residue (for feeding livestock) which are becoming paid-for-services due to the conversation of rangelands to other uses. As an example, MF could be used to support the purchase of large water bags or bladders known locally as "girab" which are the size of inflatable boats. For the past 5 years, herders have placed these bladders strategically to serve their camps or to enable animals to

[10] Feinstein International Center, Tufts University and UNEP Study, *Standing Wealth: Pastoralism Livestock Production and Local Livelihoods in Sudan*, 2013

exploit otherwise unusable good quality pasture. One full bladder has been shown to have enough supply to water 300 sheep over 45 days in the cold dry season and 30 days during the hot, dry season.

123. The development of tailored microfinance products for pastoralists can provide the necessary capital to deal with rising costs and paid-for-services. Tailored products need to be flexible for pastoralists because pastoral/nomadic movements are particular. With few exceptions, the only time in the year in which livestock on rain-fed pasture in Sudan can put on weight is between the growth of the first grass (June) and the beginning of the cold dry season (December). At this time, nomadic pastoralists are more sedentary. This means that there is a relatively small window of opportunity for financial services to mobilize cost-effective outreach to the pastoralists at this time when they move as little as possible. Furthermore, the livestock market has a seasonal variation. Trading seasons can range from 3 to 6 months which limits the time when pastoralists can pay back loans.

124. LDCF funds will be used to support the development of flexible MF products for pastoralists. The MF products will consider loan repayment schedules relative to when the trading season takes place. They will also consider the known migratory patterns of pastoralists (see Annex 9d in Project Document) and the times when pastoralists are more sedentary on rain-fed pasture. To support the detection of migratory movements, LDCF funds will be used to support GPS tracking of pastoralists in order to facilitate outreach and financial service support (Activity 3.1.8).

125. It should be noted that the demand for Microfinance and Weather Index Insurance by pastoralists is unknown. As such, LDCF funds will be used to support an in-depth study to determine this demand during project implementation (Activity 2.3.1). This study will lay the foundation detailing how financial service providers can optimally serve the needs of the pastoral production market and its associated value chains.

126. In addition, although the development and incorporation of WII into a financial services package will be new, it should be stressed that this project will build off two successful MF initiatives. Both the ABSUMI and the Connecting Farmers to Market initiatives have successfully provided loans to farmers and agro-pastoralists. ABSUMI has also successfully established a savings program while the Farmers to Market project has combined MF with MI.

127. LDCF funds will build on these baseline projects and country initiatives in the following manner:

- Building on the ***Agricultural Research Corporation's*** (ARC's) expertise in improving production technologies and in facilitating the distribution and adoption of approved technologies dealing with crop and livestock production. ARC has developed adaptation technologies for land preparation, irrigation, water harvesting, rangeland and pasture improvement, plant and animal nutrition, pest and disease control, and agricultural engineering. Acting as the technical operational arm of the Ministry of Agriculture, ARC has significant experience in assisting Extension Services such as through the Seed Development Project where it is responsible for seed propagation and testing. In return, the LDCF2 project will support ARC and Extension Departments in each of the 6 states to establish demonstration farms to exhibit the best practices of adaptation technologies for both crop and livestock production and to scale-up the distribution of these technologies.
- Building on the ***Agricultural Bank of Sudan's ABSUMI*** initiative will enable the LDCF2 project to coordinate with the rural women who already have access to microfinance and savings services. These women are target customers for WII financial services by combining WII with their current MF products. The LDCF2 project will build a formalized partnership with the ABSUMI initiative to be able to effectively coordinate together to avoid duplication of activities and target areas so that the maximum number of beneficiaries is ensured (Activity 2.2.6).
- Collaborating with the ***Connecting Farmers to Market*** project which has already launched MF/MI packages to rain-fed farmers: The LDCF2 project will incorporate lessons learned from this project on how to develop flexible payment schedule approaches. Also, the LDCF2 project will also coordinate with other agencies that have significant capacity building experience within the framework of the Connecting Farmers to Market project. For instance, the LDCF2 project will exploit its planned collaboration with the Sudanese Microfinance Development Cooperation (SMDC) to gain expertise in organizing and coordinating steering committees at central and state levels.
- Building on the Central Bank of Sudan's (CBOs) current support for MF: Working with the CBOS offers an opportunity to develop index insurance that can be provided back to back with credit and other microfinance services for farmers and pastoralists in rain-fed areas. By building on the CBOS's existing lending capacities,

considerable amounts of subsidized lending for adaptation can be unlocked. Insurance contracts, loan conditions and regulatory frameworks will be re-evaluated through the LDCF2 project.

A.6 Risks, including climate change, potential social and environmental risks that might prevent the project objectives from being achieved, and measures that address these risks:

128. Risks and recommended countermeasures were identified during bilateral consultations during the project preparation phase.

Key risks and mitigation measures underlying project development are indicated in Table 4.

Table 4: Key risks and assumptions

Risk	Level	Mitigation Measure
Targeted farmers and pastoralists are skeptical and unwilling to engage into the index-insurance scheme	High	The project will invest resources in familiarizing the target community with index-insurance that will be designed to yield a benefit that exceeds the cost. The product will also be designed in a way that is affordable to the target community and so that basis risk is low.
Insurance companies are not incentivized and motivated to deal with small holders because parcels are too scattered, too remote and risks are too high (rainfall must be > 300 mm)	Medium	Flexible microfinance products linked with micro-insurance will be developed to target small holder rain-fed farmers and pastoralists. The beneficiaries will be more willing to accept the insurance products because the regulatory framework for compensation criteria will be updated so that compensation can become clear and streamlined.
Limited reinsurance companies willing to back high-risk small holder rain-fed farmers and pastoralists	Low	Experience through the Connect the Farmers to Market (CFM) project has shown that small holder rain-fed farmers can be effectively provided insurance and backed by reinsurance providers. The LDCF2 project will be building a formalized partnership with the CFM project, incorporating their lessons learned, and designing MF-MI products (e.g., WII) which will reduce the risks for insurers due to the mandated adoption of CC adaptation technologies by beneficiaries.
Delay for insurance compensation which could hinder next year harvests	Medium	The micro-insurance policies geared towards farmers and pastoralists will be reviewed and revised so that compensation criteria are clear and compensation is streamlined.
Index insurance and the adoption of creative solutions, such as remotely	High	Budget includes significant training for trainers and training for beneficiaries. The budget and workplan

sensed data-based indices, are likely to be challenging for insurance companies. Consequently, they will not have the experience and knowledge to adapt the product to new crops and data		also provide ample budget and time to properly design the WII product. Legal and regulatory frameworks will also be adapted to facilitate the development and delivery of WII. Most importantly, feedback from beneficiaries will be facilitated.
High upfront costs in developing WII may not be cost-effective and can lead others towards cheaper traditional forms of micro-insurance	High	In the long-run, index insurance is less expensive to the administrator because there are no on-site inspections or individual loss assessments to perform. (Payout is based on an independent and exogenous weather parameter.) Scaling-up in terms of policy-holders will be supported by first pilot testing the WWI product. Insurance costs become minimized over time through planning of optimal (adaptation oriented) inputs and as yields rise.
The existence of other informal rural credit programmes which provide more flexibility but which are not linked to adaptation	Medium	Informal microfinance is practiced by local merchants and community members. Informal loans are small in quantity and scale because lenders generally receive personal guarantees rather than real collaterals. As such, informal loans are not geared to assist large populations nor to assist in cases of dispute or non-repayment due to the absence of a legal framework. This project will provide the legal and regulatory frameworks to have flexible and tailored loan products and will be able to serve larger populations. Most importantly, lenders are likely to get better returns because the loans will be linked with adaptation technologies.
Limited comprehension of weather/climate information and agricultural advisories	Low	SMA has experience in providing forecasts to the farmers. Extension Services will be used to simplify and translate all messages into simplified and local languages for each target state.
Data sharing is hindered by lack of coordination / willingness of agencies to share data or by technical constraints (e.g., bandwidth issues or local mobile telecommunication networks)	Medium	A cloud-based database will be accessible to all Stakeholders from the information production, dissemination and exploitation sides including SMA, RSA, MoWRE, ARC, M. Ag, M. Livestock, MFIs, Insurance companies, Extension Services, HAC, NGOs
Sudan does not have enough government financing to continue monitoring/research and will not be able to consider recurring O&M/training costs in government budget lines	Medium	By making EWS/CI more useful to various sectors, this pushes the Government to include stable, core budget lines for climate/weather services due to their cross-sectoral importance. Capacity for long-term planning and costing will be built in all information production agencies.

Trained, qualified engineers/technicians leave for more lucrative positions ("brain drain"). Unavailability and limited sustainability of requisite human resources and technical/operational capacities	Medium	Requirements for training as per signed contracts and TORs will be to stay at their respective institute for 2 years (as per Sudanese law) in order to transfer knowledge to others. Also, junior staff will be targeted and training will take place in pairs wherever possible.
Natural disasters damage infrastructure (particularly floods)	High	Robust infrastructure will be procured and training and spare parts will be provided for repair and maintenance in each technical, information production agency.

A.7. Coordination with other relevant GEF financed initiatives

129. The proposed second LDCF project (LDCF2) will build strategically on the LDCF1 (first NAPA follow-up) project that is currently under implementation in phase II. The LDCF2 project will focus activities in the same regions of high rainfall variability, thereby providing complementary risk management mechanisms to support the on-going adaptation technology implementations in LDCF1.

130. The on-going LDCF1 project aims to introduce a set of adaptation measures targeted towards small-scale rain-fed farmers and pastoralists residing in 4 highly vulnerable agro-ecological regions (River Nile State, Northern Kordofan, Gedarif and Southern Darfur), as identified by the NAPA. The LDCF1 project is in the process of implementing measures of share-cropping, water harvesting, sand stabilization and tillage adjustments, rangeland and farm crop diversification, strengthening local leadership for adaptation, communal funds for shock absorption and community-based early warning. The choice of States for LDCF1 was justified by the Sudan Poverty Reduction Paper, which used a combined index to measure deprivation. The States of the Red Sea, Blue Nile, Kassala, and North and South Kordofan emerged as the most deprived areas for both rural and urban populations. Consequently, these regions were prioritized for poverty reduction efforts. For the LDCF2 project, by putting an additional overlay of climate risk, measured by a high coefficient of variability for rainfall, which can be directly correlated with rural incomes, Kassala, White Nile, North Kordofan and Gedarif States emerged as additional vulnerable regions and have consequently been prioritized as target locations for the proposed project. Therefore, the LDCF2 initiative will focus on implementing climate risk finance measures in the original 4 agro-ecological zones (Annex 9a in the Project Document) and will extend geographically to cover the States of Kassala and White Nile that equally meet the above criteria of climate variability, reliability on climate sensitive livelihood and high incidents of climate poverty.

131. To maximize use of financial resources in addressing residual climate risk, the LDCF2 project will work with existing beneficiaries in 4 of the 6 target states, who have already adopted adaptation technologies. As these populations are already knowledgeable and experienced on adaptation technologies, they will serve to be key target groups to test financial and insurance services. These target populations also now possess a deeper understanding of climate change and the value of participatory approaches, which will enable them to more effectively judge how the provision of financial services can help to build their resilience to climate change.

132. According to the mid-term evaluation of the LDCF1 project, it was recommended that all adaptation projects in the natural resources sector should be integrated into a single strategic, long-term approach. The LDCF2 project will be closely aligned with many of the LDCF1 objectives, and address some of the main recommendations from the mid-term evaluation of the LDCF1 project, namely to focus on organizational, economic and financial practices of the communities in the face of climate change, addressing issues such as credit, market access and insurance.

133. As such, the LDCF2 project can be seen as highly complementary to the LDCF1 by strategically filling in the gaps identified in the LDCF1 project. The gaps to be filled include:

134.

- Bringing additional expertise on the social, economic and business aspects of agricultural production/water management/climate change to the sites;
- Bringing additional resources for knowledge management, lesson learning, and participatory planning brought to the States and the sites; and
- Engaging with existing Stakeholders on how to improve their resilience to CC by facilitating access to financial services and conducting strategic, localized assessments with villages and state level stakeholders prior to developing the WII and microfinance products.

135. The LDCF2 project will also learn from and build on the successful aspects of the LDCF1 project by using the similar Technical Committee (TC) structure at state levels. In the case of the LDCF2 project where multi-disciplinary expertise is required, a state-based MFI focal point, state insurance agent, adaptation technology expert and gender-focused NGO/CSO will be included in the committees. The current State NAPA or NAP coordinators will provide a support role to the TCs to ensure no duplication of activities with other adaptation-related initiatives.

136. In addition to the LDCF1 project, other regional related projects focusing on early warning, adaptation and/or microfinance include the following:

137. The ***FISU*** project (worth €380,000, to be completed in 2014) provided by the Finish Government aims is promoting adaptation to climate change by reducing weather and climate-related losses through improved agro-meteorology services in Sudan. FISU addresses issues of sustainable development and peace-building by promoting North-South cooperation at the Sudan Meteorological Authority (SMA).

138. The Famine Early Warning Systems Network (***FEWS NET*** funded by USAID) data portal provides access to geo-spatial data, satellite image products, and derived data products in support of FEWS NET monitoring needs throughout the world. Sudan exploits FEWS NET products, such as IPC Version 2 by FEWS NET and is contributing to the Integrated Food Security Phase Classification (***IPC***) project (EU). The Humanitarian Aid Commission (HAC) is working with FEWS NET to provide baseline information for livelihood zones, under a side project funded by USAID (150,000 USD, 2013-2014).

139. The ***Eastern Nile Technical Regional Office (ENTRO***), a technical regional body supporting the implementation of ***Eastern Nile Subsidiary Action Program (ENSAP***) has a programme entitled, Design of an Upgraded Data Acquisition, Communication and Flood Forecasting Systems. ENTRO intends to provide Regional Flood Coordination in Addis Ababa to support flood forecasting and mitigation efforts in Ethiopia, Egypt, and Sudan and to facilitate data exchange between the three countries, all Eastern Nile States. Also, the ***Flood Preparedness and Early Warning Project, FPEW II*** is the second phase of one of ENTRO's fast track projects planned to support hydrologic forecasting and flood early warning in the Eastern Nile countries. The objective of the FPEW II project is to support operational flood forecasting through inter-country data exchange, improved emergency response by governments at all levels and community preparedness.

140. The ***IGAD-HYCOS*** project aims to establish a regional water management information system and to strengthen observation networks and their real-time data transmission within participating countries including Kenya, Uganda, Sudan, Ethiopia, Somalia, Eritrea and Djibouti and more recently South Sudan, Burundi and Rwanda. IGAD-HYCOS also includes promoting enhanced regional cooperation for the collection, analysis, dissemination and exchange of hydrological and hydro-meteorological data and information for water related decision making.

141. The United Nations Office for Outer Space Affairs (**UNOOSA**) is presently supporting RSA to use space technology data for natural resources management, environmental monitoring and disaster management. Similarly, the **UN-SPIDER** program is providing support to RSA with training workshops in Disaster Risk Management which detail available data sources and open source software and free models that support climate forecast and early warning.

142. RSA is currently being supported by the **Global Monitoring for Food Security** (GMFS) project funded by the European Space Agency to optimize agricultural surveys with satellite earth observations.

143. The ***North Kardofan Services Project,*** which is focusing on building capacities to perform rainwater harvesting.

144. The ***Great Green Wall Initiative-GGW***[11] (100 million USD, with donors including WB, UNEP, WFP, UNCCD and GEF, signed 2010, to begin in 2013) is an on-going initiative aiming to "green" the African continent across the 4,400 mile east-west axis of the continent as a defence against rapid, expanding desertification of the Sahara. The project includes 11 countries, one of which being Sudan having the largest GGW stretch of 1,500 kilometres long and 25 kilometres wide. The aim is to tackle poverty and the degradation of soils and it is expected that in 2013, Sudan will begin partaking in the GGW to support Sudan's important Arabic gum belt. The GGW initiative will address policy, investment, and institutional barriers that exacerbate the effects of climate change and variability, leading to desertification and deterioration of the environment and natural resources and the risk of conflicts between communities. International Colloquiums are currently held to discuss barriers as well as share available knowledge on vegetal species.

145. ***Peace Consolidation Project*** (World Bank and SMDC), which is providing Microfinance services to South Darfur.

146. Overall, the proposed LDCF2 project will coordinate and share information with these other LDCF-financed interventions aiming to strengthen hydro-meteorological services and early-warning systems by providing funds to support the technical institutions (Sudan Meteorological Authority, Remote Sensing Authority, etc) to attend regional trainings in Ethiopia and/or elsewhere in Africa and abroad. As data will be centralized in a cloud database (see Figure 1 in the Project Document), it will be possible to share information with other National Meteorological Agencies and with regionally based forecasting centres to improve the quality of forecasts and facilitate downscaling.

B. ADDITIONAL INFORMATION NOT ADDRESSED AT PIF STAGE:

B.1 Describe how the stakeholders will be engaged in project implementation.

147. The Stakeholders identified during project preparation will continue to be implicated in project implementation. A Stakeholder involvement plan has been created to provide a framework to guide interaction between implementing partners and the key stakeholders, particularly end-users to validate project progress. All Stakeholders involved in the baseline self-capacity assessment will be addressed again in order to track the efficacy of Stakeholder capacity building both operationally and technically. Also, the women's interest organizations, housed at Ahfad University will continue to be implicated and consulted in order to ensure women are properly engaged / warned. These gender-focused NGOs/CSOs will conduct the gender disaggregated survey indicating the receipt of alerts and adoption of financial services by women. Women groups established by and partnered with MFIs in addition to women agricultures associations who have been exposed to Training of Trainers programs in different areas will also be consulted.

148. During project development, key public participation Stakeholders including CSOs and indigenous people were identified. They will continue to be implicated during project implementation. Their expected roles are indicated in the following table.

Table 5: Stakeholder Involvement Matrix

Farmer's Trade Union in each State	- Identify the types of crops grown and the types of livestock raised and the production systems being followed by participating farmers - Select farmers who will be willing to collaborate to undertake technology field evaluation on his/her farm and provide an on-farm demonstration site to train other farmers in improved technologies and best practices - Facilitate the formation of Community Based Organizations to lead project implementation in the targeted village clusters - Participate in one or more Community Orientation/Mobilization meeting(s) in

[11] http://sudanow.info/new/interview/the-african-great-green-wall-interview-with-environment-minister-hassan-a-hilal/

	each of the villages - Participate in project planning for community level activities, focusing on agriculture - One representative from the Trade Union will be involved in the Technical Committee for each State
Pastoralist's Trade Union in each State	- Identify the types of livestock raised and the production systems being followed by participating pastoralists - Select pastoralists who will be willing to collaborate to undertake adaptation and dry-land technology field evaluations - Facilitate the formation of Community Based Organizations to lead project implementation in the targeted village clusters - Participate in one or more Community Orientation/Mobilization meeting(s) in each of the villages - Participate in project planning for community level activities, focusing on pastoralism - One representative from the Trade Union will be involved in the Technical Committee for each State
Practical Action	- Inform community members about the main aspects and implementation modalities of the Project, including the importance of community participation in all stages of the entire project development process - Discuss the project interactions and some of the linkages with other projects (e.g., the LDCF1 project or planned NAP initiatives) - Assess the community's interest to participate actively in the entire project development process and the willingness to become responsible for the implementation and management of the project development - Discuss the need to form a representative Community Based Organization.
Youth/Women Society Organizations (Women's Union of Kassala, Sudanese Youth Union)	- Facilitating the community participatory planning process to implement activities, focusing on the involvement of women and children - Establish community rules and regulations by which the community cooperatives receive and pay back borrowed money for different adaptation purposes - Support women's involvement in microfinance promoting awareness of successful national initiatives for women such as ABSUMI - Participate in gender-disaggregated assessments and site identifications for community adaptation interventions - Serve as a permanent focal point with the State Technical Committee - Nominate one gender focused representative to take part in each State Technical Committee
Sudanese Climate Change Network	- Review and test of community based early warning system strategies, DRR preparedness and adaptation options - Documentation of adaptation and DRR good practices and relevant local innovations - Conduct awareness sessions at different levels including with local farmers

	and pastoralist communities to raise their knowledge by the project objectives, linkages and how to maximize their benefits - Facilitate meteorological data collection and early warning dissemination to improve seasonal rainfall forecasts and climate services - Facilitate vulnerability assessments and baseline surveys at community levels using participatory approaches and methods - Conduct capacity building workshops at community levels on the use of weather/climate information agricultural advisories - Build good linkages with other related regional and international projects, interventions and NGOs organizations particularly Pan African for Climate Change justice Network (PACJA)
MASAR (pastoralist NGO)	- Facilitate project intervention in the targeted states for pastoralists regarding: o Formation of pastoral organizations o Identifying training needs / gaps o Planning adaptation measures o Facilitating access to microfinance o Supporting the study to determine the need and feasibility of WII for pastoralists

149. During implementation, the communication and consultation process will be divided into three main phases, being:

150. Phase 1 – Developing a strategy and action plan;
This is the mobilization phase in the first year of the project. The details of the activities and implementation structures will be designed, partnerships for action will be forged and stakeholder engagement will focus around these design processes.

151. Phase 2 – Consultation through implementation; and
This is the main implementation phase where investments will be made on the ground in the target areas and stakeholder consultation about engagement will focus on output oriented action.

152. Phase 3 – Project completion and scale up promotion.
The third and final phase represents the completion of the project. The plans for scale-up and long-term sustainability of the LDCF investments will be developed. Consultation will focus on learning, bringing experience together and looking at processes for continued post-project impact.

153. Specifically, in Phase 1, gender-focused NGOs/CSOs (housed at Ahfad University) will continue to be implicated and consulted in order to ensure women are properly engaged/warned. They will also conduct the gender disaggregated survey.

154. In Phase 2, public consultations will become more of an on-going exchange of information where there will be two main purposes:

- to gather information from beneficiaries and stakeholders about the impact and effectiveness of the planned adaptation packages and WII/MF products to support adaptive management; and
- to provide interested government and donor stakeholders and the general public with information about the progress and impact of the project as it is implemented.

155. Phase 3 will be a process of ensuring completion, hand-over and long-term sustainability of the LDCF investment. Consultation will focus on bringing experience together, sharing key lessons learnt (through the UNDP ALM and other forums) and looking at processes for promoting scale up of this project in order to provide access to weather/climate information/warnings and financial services for rain-fed farmers and pastoralists.

156. Overall the types of consultation mechanisms to be used include:

- Preparation meetings with NGOs/CSOs to be implicated in alert communication;
- Initial consultation meetings in target regions to discuss appropriate weather indices for WII insurance;
- Information briefings for government and co-financing institutions on WII and MF product development;
- Initiation of public awareness campaign on EWS, MF and WII products as well as appropriate adaptation technology packages

For more details on the Stakeholders, see Section 2.9 of the Project Document.

B.2 Describe the socioeconomic benefits to be delivered by the Project at the national and local levels, including consideration of gender dimensions, and how these will support the achievement of global environment benefits (GEF Trust Fund/NPIF) or adaptation benefits (LDCF/SCCF):

157. The project will have significant adaptation and associated socio-economic benefits. This will be achieved by introduction of sustainable risk finance products (index based insurance) that will support lending to small-scale rain-fed agro-pastoral communities. As a result of the project intervention, farmers and pastoralists will be able to use insurance to safeguard investments that will increase their productivity as well as long term resilience to climate change. At least 45,000 people will directly benefit from this risk finance scheme. The scheme combined and delivered with micro-credit options will help the most vulnerable SRFP build wealth and acquire assets necessary to enable them to diversify livelihoods and better absorb climatic shocks.

158. Index insurance is appropriate in Sudan, particularly in the target regions because extreme weather is one of the major risks confronting SRFP households and has caused them to rely on slowly-released and unreliable humanitarian aid. The severity and frequency of droughts and floods is predicted to increase (See Sudan's Second National Communication), thereby incentivizing resilience building and the adoption of adaptive measures for farming/pastoral production systems. By combining credit provision with the delivery of adaptation services under the component 3, the project will turn local micro-finance institutions into the actual delivery channels for adaptation financing at the sub-national and local levels.

159. In order for this scheme to operate sustainably and maintain delivered benefits in the long run, the project, as described above, takes a capacity development and participatory approach. As such, under component 1, observation and forecasting capacity will be strengthened to improve accuracy and timeliness of climate data which is essential for any index-insurance scheme. Delivery of essential equipment and technical skills through a series of targeted trainings will improve the ability of the key institutions such as the Sudan Meteorological Authority and the Remote Sensing Authority to provide seasonal and long term forecasts as well as early warning services to vulnerable SRFP. Under

component 2, a series of financial literacy training courses will build the trust and confidence in WII. The index-insurance products will be developed with a direct and active participation of the communities along with the banks, public/private insurance companies, and government authorities. Similarly, micro-finance institutions will also be supported to deliver micro-finance products that respond to local adaptation priorities captured in community consultations through component 3.

160. Benefits to the project also include updates to the regulatory frameworks for reinsurance and co-provision of micro-insurance and micro-credit to facilitate the development of climate risk transfer products along with their integration with MF products that target farmers and pastoralists.

161. The largest economic benefits are expected from building capacity of the climate/environmental information production agencies to tailor climate products to the needs of private insurance companies. Together with satellite imagery used for land-use planning and monitoring, tailored climate products and early warnings will also provide significant local environmental benefits, such as detailing best water management practices which is crucial to help Sudan's fight against desertification. At the local level, early warnings and climate hazard mapping can provide economic benefits by reducing losses of agricultural produce, infrastructure (roads and bridges) and disruption to people's livelihoods.

162. Communities will also immediately benefit from the Standard Operating Procedure to be implemented for alert communication. The total population benefiting from these developments has the potential to grow hugely if warnings extend to a reasonable percentage of the total population e.g. through a mobile phone relay. Also, the feedback mechanism can enable the communication mechanism to be improved via end-user comments/suggestions.

163. Many of the beneficiaries will be women, especially within the agriculture sector who do not have access to information, yet are most vulnerable to food insecurity and climate change due to their dependence on natural resources for subsistence household chores and their limited access to education and information services which prohibit participation in decision-making. The project will encourage female members of farmers and pastoralists to engage in MF because experience from the ABSUMI project shows women are diligent in repayment and have high a degree of financial discipline.

164. The UNDP Environmental and Social Screening template has also been applied to ensure environmental and social safeguards are in place. According to this checklist, the project is considered Category 2 where no further safeguards must be incorporated because no environmental or social risks are foreseen (See Annex 10 in the Project Document).

165. Environmental safeguards being applied to the LDCF2 project include the following:

- Tailoring EWS/CI and agricultural advisories to support more climate resilient rain-fed farming and livestock practices
- Linking environmentally-friendly adaptation technologies (e.g., equipment/practices which decrease erosion and limit degradation) with financial services

166. Social safeguards being applied include the following:

- Facilitating access to financial services for the most vulnerable (women prioritized)
- Enabling smallholder rain-fed farmers and pastoralists to mitigate climate risks through access to insurance coverage
- Consulting villages with the Met Service and insurance companies to find the best station/equipment placement which benefits the most vulnerable
- Adopting adaptation technologies based on gender (women/youth/illiterate etc)
- Facilitating feedback from marginalized populations on the utility of weather/climate advisories, adaptation technologies and financial services

B.3. Explain how cost-effectiveness is reflected in the project design:

167. In order to implement a cost-effective project, other baseline projects were evaluated to see what relevant activities they are supporting. LDCF funds will be used to leverage partnerships to be created with existing projects to ensure that there is no duplication of activities. Activities within the project ensure that the LDCF2 project will coordinate with other initiatives by building capacities on levels where other projects are not (e.g., Focusing on building EWS capability on the national level rather than regionally (IGAD) and community-based (LDCF1) and improving microfinance services on state levels (CBS is currently working more on the national level)).

168. This project builds on the existing initiatives in terms of equipment acquisitions (building off of the LDCF1 project and the DRR project).To ensure cost-effectiveness for Outcome 1, it was critical to evaluate the equipment purchases. An assessment of existing equipment was made, noting the manufacturer, whether it is still working and whether the NHMS has an interest in continuing with particular makes/models. The NHMS weighed current costs against the costs of potentially cheaper solutions and the added costs of training personnel. They also weighed the option on the use of manual and/or automatic stations. Due to previous experiences in deploying and operating AWS, the Sudan Meteorological Authority opted to purchase a mix of automatic and manual stations. As training for AWS is intensive, it was deemed important for the cost estimates to include accurate training and operation and maintenance costs. Fifteen percent (15%) of the running costs were designated for spare parts.

169. A key design component was to try to consolidate the training programs and workshops. A coherent training programme was emphasized where one activity can cost effectively satisfy more than one of the needs identified, such as group training on-the-farm or for the Training of Trainers. Also, other baseline programs involving capacity building for the DRM, HAC, were evaluated in order to ensure that money has been spent wisely.

170. Due to project budget limitations, it was necessary to select from the long-list of equipment / capacity building needs and identify those within the scope and cost-effectiveness of this project. The chosen set of Outputs was reviewed in a validation workshop involving all stakeholders and the multi-stakeholder EWS focus group committee meeting. Based on group consensus, Outputs were revised accordingly. The Outputs outlined have been chosen based on their financial feasibility. They have been chosen over alternative ways to address project barriers as shown in Table 6.

Table 6: Demonstration of Cost-effectiveness for each proposed Output indicating the project barrier addressed by each Output

OUTPUTS	Barrier Addressed	**Alternatives Considered**
1.1 Rainfall modelling and simulations for six target states (River Nile, Gedarif, North Kordofan, and South Darfur, Kassala and White Nile States) to enable local flood forecasts and climate projections	Insufficient coverage of weather, climate and hydrological monitoring infrastructure	**Alternative 1:** Expand the hydrological monitoring network based on a cross-border watershed approach; however, this requires cross-border data sharing and more financial resources. This project lays a foundation for future initiatives to model hydrology for rain-fed farmers by establishing good monitoring networks in 6 target states. **Alternative 2:** Different equipment manufacturers can be used. However, SMA, MoWRE and RSA have experience with the current models. Using different models will increase the training and maintenance costs according to Stakeholder discussions.
1.2 Procurement of 7 climate AWS, 6 synoptic AWS and 162 rain gauges; purchase of high resolution remote sensing data; and capacity reinforcement related to new products/equipment to enhance the availability, quality and transfer of real-time weather/climate data collection on 130,000 ha of drought-prone land for drought early warning	Insufficient coverage of weather, climate and hydrological monitoring infrastructure	**Alternative 1:** Only use manual stations and incorporate SMS communication services: For forecasting and early warnings in Sudan, it is more cost-effective to use automatic weather stations (AWSs) because SMA has existing expertise in working with AWSs and using AWSs reduces the need to pay and train manual observers. Procuring only manual stations supports untimely manual reporting procedures at each station (e.g., data transmission each month). **Alternative 2:** Use stations with cheaper sensors to decrease the cost of spare parts: If sensors do not adhere to WMO standards, WMO will not consider the station data in regional and global models. As a result, the country's data would not be assimilated to improve the regional and international forecasting models the country will exploit and downscale. **Alternative 3:** Use outside satellite viewing products for free: this option will be considered where regional and international databases (e.g., FEWSNET and NOAA's CFS tools) will be exploited to support Sudan to assimilate data into national forecasting. However, satellite data is difficult to interpret real-time without significant experience. As a result, such free satellite visualization tools are planned to validate forecasts or be used in climate change projections. Also, free satellite products do not offer high enough resolutions to support claim validation. **Alternative 4:** Acquiring more equipment to improve national coverage: This project is focusing on capacity development for service delivery rather than excessive procurement. Good and targeted service delivery of WII products informed by accurate weather/climate information is more likely to ensure the sustainability of continued monitoring and the use of such information to support climate risk finance.
1.3 SMA, RSA and	Poor long-term sustainability of	**Alternative 1:** Use outside forecasting products for free: this option will be considered, such as NOAA's CFS forecasting tool which is readily available and free, however, these

OUTPUTS	Barrier Addressed	**Alternatives Considered**
MoWRE are trained to provide sustainable services on weather/climate observation, risk analysis, forecasting and early warning including the establishment of a farm information management system and the revitalization of targeted seasonal forecast delivery for rain-fed farmers and pastoralists	observational infrastructure and technically skilled human resources	products must be downscaled and calibrated with in situ data. Therefore, regional and international databases (e.g., FEWSNET and NOAA's CFS tools) will be exploited to support Sudan to develop national forecasting by translating open-source climate monitoring and forecasts into flooding and drought/food security information. **Alternative 2:** SADIS ($50,000) is a satellite data distribution system. The system works well, but forecasters must build enough qualifications to use the system, so capacity building costs are too high to consider this a cost-effective option. **Alternative 3**: One-time training to save financial resources: This project will procure, in a staggered manner, a rational amount of stations considering human resource constraints so that the new stations can be well-integrated with existing NHMS and there are no continuity breaks in monitoring (i.e., problem if all resources are focused on procurement and existing stations are neglected). Budget has therefore been allotted to provide training each year as more personnel are absorbed and more equipment is procured. **Alternative 4:** All operation and maintenance can be outsourced to a private company through a PPP (public private partnership) to enable the company time to train information production personnel over a longer period of time. However, SMA and MoWRE already have experience with learning-by-doing and has received training for many of the specific monitoring instruments they have requested to be acquired.
1.4 Improved communication protocols and mechanisms (i.e. partnership with mobile phone operators) to provide timely and accurate weather and climate risk forecasts to rain-fed farmers and pastoralists in 6 target states	Challenges in producing tailored weather/climate information and agricultural advisories Challenges with cross sectorial data sharing and institutional collaboration	**Alternative 1**: Have separate data portals for each agency to ensure security: however, this would prohibit the easy use of data across agencies and with the extension services (See Figure 1) **Alternative 2:** Do nothing, if seasonal forecasts and early warnings are not communicated properly, alerts and forecasts will not be used to build SRFP resilience. Also, users will continue to lack confidence in alerts if the uncertainty of forecasts is not conveyed to the general public. A public awareness campaign by extension services and NGOs/CSOS is planned to inform SRFP about the utility of agricultural advisories and forecasts to help them build resilience to climate extremes.

OUTPUTS	Barrier Addressed	**Alternatives Considered**
2.1 Comparative analysis and feasibility assessment of different business models for index-based insurance	Long approval and complicated compensation process for existing insurance products No experience with Weather Index Insurance products	**Alternative 1**: Rely on existing business models to create WII products; Insurance scheme viability must be tested in the field to fully understand value chains, uses of inputs, main risks and how to link credit with insurance in order to develop realistic premiums.
2.2 At least 6 index based insurance products (e.g., Weather Index Insurance) designed and introduced, covering at least 45,000 farmers and pastoralists who depend on rain-fed farming systems, including the creation of a nationally-based WII marketing and development team	Long approval and complicated compensation process for existing insurance products No experience with Weather Index Insurance products	**Alternative 1**: Use existing classical insurance products for agriculture which are cheaper in the short time: In the long-run, index insurance is less expensive to the administrator because there are no on-site inspections or individual loss assessments to perform. (Pay-out is based on an independent and exogenous weather parameter.) Also, insurance costs become minimized over time through planning of optimal (adaptation oriented) inputs and as yields rise. Most importantly, because the index is quantifiable (e.g., surpassing a threshold) and not subject to the impartiality of claims adjustors, compensation criteria are clear. **Alternative 2:** Outsource WII product development to a private company. However, little national capacity will be built so as to get feedback from end-users and be able to adapt the models as more data becomes available. Furthermore, adjusting compensation schemes based on new types of data (e.g., higher resolution satellite data) will not be possible unless outside expertise is recruited to train a nationally-based WII development team.
2.3 Insurance literacy programme / awareness campaign designed and delivered to small businesses, community-based organisations, local farmers and pastoral	Long approval and complicated compensation process for existing insurance products No experience with Weather Index	**Alternative 1:** Use existing insurance literacy among SRFP: Stakeholder consultations indicated that SRFP do not take out insurance plans because the approval process is long and the compensation process is not understood: Because WII is new to Sudan, ample budget and time must be provided to train insurance agents on the WII product and to obtain feedback from rain-fed farmers and pastoralists on their needs. The project will invest resources in familiarizing the target community with index-insurance such that it will be designed in a way that is affordable and understandable for the target community.

OUTPUTS	Barrier Addressed	**Alternatives Considered**
communities	Insurance products	
2.4 Legal and regulatory framework for risk transfer in target states assessed, policy recommendations developed and reinsurance secured	Long approval and complicated compensation process for existing insurance products No experience with Weather Index Insurance products	**Alternative 1:** Rely on existing legal and regulatory frameworks; however these frameworks are not adapted to facilitate the development and delivery of WII. Moreover, beneficiaries will be more willing to accept the new insurance products if the regulatory framework is revised so that compensation can become clear and streamlined.
3.1 In each state at least 1 adaptation options/packages developed to inform and enable the provision of MFI credit packages to stimulate smallholder adaptation and disaster risk reduction including the transfer of adaptation technologies to make crop and livestock production more resilient	Lack of customized and understandable microfinance services for rural clients	**Alternative 1**: Existing case is not offering adaptation technologies/practices with MF (0 USD) which will not provide a means for the SRFP to have sustainable farming/pastoral practices and can contribute to mal-adaptation practices. There are also numerous ready, proven climate change adaptation technologies developed by the Agricultural Research Commission which can easily be adopted by rain-fed farmers/pastoralists, including women and children to help them build more resilient practices.
3.2 Legal and regulatory frameworks reviewed, analysed and improved to increase the co-provision of microcredit and micro-insurance services	Lack of customized and understandable microfinance services for rural clients	**Alternative 1:** Rely on existing legal and regulatory frameworks; however these frameworks are not adapted to facilitate the development and delivery of MF geared towards SRFPs. Moreover, beneficiaries will be more willing to accept the new MF products if the regulatory frameworks are revised so that payment schedules are more flexible and adaptation technologies offered with the MF products are more geared towards specific SRFP livelihood needs.
3.3 At least three micro-	Lack of customized	**Alternative 1:** Offering classical MF (Additional cost 0 USD) rather than targeted MF

OUTPUTS	Barrier Addressed	**Alternatives Considered**
credit, flexible loan products designed and tested to account for pastoral mobility and income cycles of smallholder rainfed farmers and pastoralists (SRFP) (Each product will specify appropriate loan size, prices, repayment schedules, and eligibility criteria geared toward rain-fed farmers and pastoralists and offered through financial service providers to increase resilience of farming and pastoral practices as prioritised in local adaptation plans)	and understandable microfinance services for rural clients	products will not enable the rural population at poverty level who have little assets or farming skills to repay their loans. By linking these loans with adaptation technologies, they will build resilient farming and pastoral practices. Furthermore, if products are not developed with flexible payment schedules based on seasonal cultivation or pastoral markets, SRFP will be unable to repay their debts and lose confidence in new products, Consequently, SRFP will likely resort to informal lenders. However, informal loans are not geared to assist large populations and without a legal framework, cases of dispute and non-repayment are often neglected.
3.4 Organization and capacity development for smallholder rain-fed farmers and pastoralists (SRFP) on newly developed and targeted financial services including training on a financial services management manual	Lack of customized and understandable microfinance services for rural clients	**Alternative 1:** Promote individual loans for SRFPs; however, there will be a much greater chance that the MF products will not be successfully used due to an insufficient collective asset base. As SRFP are new to financial concepts, individual loans will not provide a necessary safety net to enable group training. The net loss equivalent to the cost of MF product development will be much greater than the relatively small investment required to organize and train the smallholder rain-fed farmers and pastoralists when SRFP are organized. They can be more easily guided by experienced extension officers and it becomes easier to build financial literacy and sustainable agro-pastoral practices.

C. DESCRIBE THE BUDGETED M &E PLAN:

171. The project will be monitored through the following M&E activities. The M&E budget is provided in table 6 below. The M&E framework set out in the Project Results Framework in Part III of this project document is aligned with the AMAT and UNDP M&E frameworks.

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

173. The **Inception Workshop** should address a number of key issues including:

174. Assist all partners to fully understand and take ownership of the project. Detail the roles, support services and complementary responsibilities of UNDP CO and Regional Coordinating Unit (RCU) staff (i.e. UNDP-GEF Regional Technical Advisor) vis-à-vis the project team. Discuss the roles, functions, and responsibilities within the project's decision-making structures, including reporting and communication lines, and conflict resolution mechanisms. The Terms of Reference for project staff will be discussed again as needed.

175. Based on the project results framework and the LDCF related AMAT set out in the Project Results Framework in Section III of this project document, and finalize the first annual work plan. Review and agree on the indicators, targets and their means of verification, and recheck assumptions and risks.

176. Provide a detailed overview of reporting, monitoring and evaluation (M&E) requirements. The Monitoring and Evaluation work plan and budget should be agreed and scheduled.

177. Discuss financial reporting procedures and obligations, and arrangements for annual audit.

178. Plan and schedule Steering Committee meetings. Roles and responsibilities of all project organisation structures should be clarified and meetings planned. The first Steering Committee meeting should be held within the first 12 months following the inception workshop.

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

Quarterly:

180. Progress made shall be monitored in the UNDP Enhanced Results Based Management Platform. Based on the initial risk analysis submitted, the risk log shall be regularly updated in ATLAS. Risks become critical when the impact and probability are high. Note that for UNDP/GEF projects, all financial risks associated with financial instruments such as revolving funds, microfinance schemes, or capitalization of ESCOs are automatically classified as critical on the basis of their innovative nature (high impact and uncertainty due to no previous experience justifies classification as critical).

- Based on the information recorded in Atlas, a Project Progress Reports (PPR) can be generated in the Executive Snapshot.
- Other ATLAS logs will be used to monitor issues, lessons learned. The use of these functions is a key indicator in the UNDP Executive Balanced Scorecard.

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

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

- Progress made toward project objective and project outcomes - each with indicators, baseline data and end-of-project targets (cumulative)
- Project outputs delivered per project outcome (annual).
- Lesson learned/good practice.
- AWP and other expenditure reports
- Risk and adaptive management
- ATLAS QPR

183. Periodic Monitoring through site visits: UNDP CO and the UNDP-GEF region-based staff will conduct visits to project sites based on the agreed schedule in the project's Inception Report/Annual Work Plan to assess first hand project progress. Other members of the Project Board may also join these visits. A Field Visit Report/BTOR will be prepared by the CO and UNDP RCU and will be circulated no less than one month after the visit to the project team and Project Board members.

184. Mid-term of project cycle: The project will undergo an independent Mid-Term Review at the mid-point of project implementation (expected to be in May 2016). The Mid-Term Review will determine progress being made toward the achievement of outcomes and will identify course correction if needed. It will focus on the effectiveness, efficiency and timeliness of project implementation; will highlight issues requiring decisions and actions; and will present initial lessons learned about project design, implementation and management. Findings of this review will be incorporated as recommendations for enhanced implementation during the final half of the project's term. The organization, terms of reference and timing of the mid-term review will be decided after consultation between the parties to the project document. The Terms of Reference for this Mid-term review will be prepared by the UNDP CO based on guidance from the Regional Coordinating Unit (RCU) and UNDP-GEF. The LDFC/SCCF AMAT as set out in the Project Results Framework in Section III of this project document) will also be completed during the mid-term evaluation cycle.

185. End of Project: An independent Terminal Evaluation will take place three months prior to the final PB meeting and will be undertaken in accordance with UNDP-GEF guidance. The terminal evaluation will focus on the delivery of the project's results as initially planned (and as corrected after the mid-term review, if any such correction took place). The terminal evaluation will look at impact and sustainability of results, including the contribution to capacity development and the achievement of global environmental benefits/goals. The Terms of Reference for this evaluation will be prepared by the UNDP CO based on guidance from the Regional Coordinating Unit and UNDP-GEF. The LDFC/SCCF AMAT as set out in the Project Results Framework in Section III of this project document) will also be completed during the terminal evaluation cycle. The Terminal Evaluation should also provide recommendations for follow-up activities and requires a management response, which should be uploaded to PIMS and to the UNDP Evaluation Office Evaluation Resource Centre (ERC).

186. Learning and knowledge sharing: Results from the project will be disseminated within and beyond the project intervention zone through existing information sharing networks and forums.

187. The project will identify and participate, as relevant and appropriate, in scientific, policy-based and/or any other networks, which may be of benefit to project implementation though lessons learned. The project will identify, analyze, and share lessons learned that might be beneficial in the design and implementation of similar future projects. There will be a two-way flow of information between this project and other projects of a similar focus.

188. Audit: Project will be audited in accordance with UNDP Financial Regulations and Rules and applicable audit policies.

Table 6: Project Monitoring and Evaluation work plan and budget

Type of M&E activity	Responsible Parties	Budget US$ *Excluding project team staff time*	Time frame
Inception Workshop and Report	▪ Project Manager ▪ PIU (Project Implementation Unit) ▪ UNDP CO, UNDP GEF	Indicative cost: 10,000	Within first two months of project start up
Measurement of Means of Verification of project results.	▪ UNDP GEF RTA/Project Manager will oversee the hiring of specific studies and institutions, and delegate responsibilities to relevant team members. ▪ PIU, esp. M&E expert	To be finalized in Inception Phase and Workshop.	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	▪ Oversight by Project Manager ▪ PIU, esp. M&E expert ▪ Implementation teams	To be determined as part of the Annual Work Plan's preparation. Indicative cost is 20,000	Annually prior to APR/PIR and to the definition of annual work plans
ARR/PIR	▪ Project manager ▪ PIU ▪ UNDP CO ▪ UNDP RTA ▪ UNDP EEG	None	Annually
Periodic status/ progress reports	▪ Project manager and team	None	Quarterly
Mid-term Review	▪ Project manager ▪ PIU ▪ UNDP CO ▪ UNDP RCU ▪ External Consultants (i.e. evaluation team)	Indicative cost: 40,000	At the mid-point of project implementation.
Terminal Evaluation	▪ Project manager ▪ PIU ▪ UNDP CO ▪ UNDP RCU ▪ External Consultants (i.e. evaluation team)	Indicative cost : 40,000	At least three months before the end of project implementation
Audit	▪ UNDP CO ▪ Project manager ▪ PIU	Indicative cost per year: 3,000 (12,000 total)	Yearly
Visits to field sites	▪ UNDP CO ▪ UNDP RCU (as appropriate)	For GEF supported	Yearly for UNDP

Type of M&E activity	Responsible Parties	Budget US$ *Excluding project team staff time*	Time frame
	▪ Government representatives	projects, paid from IA fees and operational budget	CO
TOTAL indicative COST Excluding project team staff time and UNDP staff and travel expenses		US$ 122,000 (+/- 5% of total GEF budget)	

PART III: 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 form. For SGP, use this OFP endorsement letter).

NAME	POSITION	MINISTRY	DATE*(MM/dd/yyyy)*
Mamoun Eisa Abdelgader	GEF Operational Focal Point	MINISTRY OF ENVIRONMENT, FORESTRY AND PHYSICAL DEVELOPMENT	08/08/2011

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
Adriana Dinu, Officer-in-Charge, and Deputy Executive Coordinator, UNDP/GEF		March 26, 2014	Tom Twining-Ward, Senior Technical Officer	+421259337386	tom.twining-ward@undp.org

ANNEX A: PROJECT RESULTS FRAMEWORK(either copy and paste here the framework from the Agency document, or provide reference to the page in the project document where the framework could be found).

This project will contribute to achieving the following Country Programme Outcome as defined in CPAP:

CPAP FOCUS AREA 1 OUTPUT 2: Equitable livelihoods initiatives for rural and urban communities are supported for recovery and development

CPAP FOCUS AREA 2 OUTPUT 1: Vulnerable communities to climate change and climatic risks adapted comprehensive sets of adaptation measures

CPAP Focus AREA 2 OUTPUT 3: Environmental governance policies and regulatory frameworks for enabling better natural resources and risk management developed

Country Programme Outcome Indicators:

UNDAF OUTCOME 1 INDICATOR 2: Number of private sector companies and microfinance institutions providing microfinance services

UNDAF OUTCOME 2 INDICATOR 2: Number of vulnerable, especially female headed, households adopting climate change adaptation measures

UNDAF OUTCOME 2 INDICATOR 4: Number of states with functioning early warning systems, including flood and drought preparedness systems

Primary Applicable Key Environment and Sustainable Development Key Result Area (same as that on the cover page, circle one): Promote climate change adaptation

Applicable GEF Strategic Objective and Program:

OBJECTIVE 2: Increase adaptive capacity to respond to the impacts of climate change, including variability, at local, national, regional and global level

Applicable GEF Expected Outcomes:

Outcome 2.1: Increased knowledge and understanding of climate variability and change-induced risks at country level and in targeted vulnerable areas
Outcome 2.2: Strengthened adaptive capacity to reduce risks to climate-induced economic losses

Applicable GEF Outcome Indicators:

- Relevant risk information disseminated to stakeholders
- Type and no. monitoring systems in place
- % of population covered by climate change risk measures

	Indicator	Baseline	Targets End of Project	Source of verification	Risks and Assumptions
Project	1.Number of small-holder rain-fed	1. MFIs/Insurance companies have limited capacity to provide tailored	1. TARGET 138,500 small-holder rain-fed farmers and	1. Capacity assessment scores	RISK 1

Objective[12] To increase climate resilience of rain-fed farmer and pastoral communities in regions of high rainfall variability through climate risk financing	farmers and pastoralist households with access to MF or MF/WII products 2.Domestic finance committed to the relevant institutions to monitor extreme weather and climate change	financial services for smallholder rain-fed farmers and pastoralists. Current products are too generalized and do not consider flexible payment cycles and reasonable compensation criteria. MFIs/Insurance companies have not found means to access the remote, rural areas (e.g., mobile units), organize the farmers/pastoralists nor mitigate their associated risks. As a result, it is common that farmers/pastoralists use informal lending services. BASELINE:93,500 with access to MF, 0 with access to MF/WII; 2.Existing budget plans do not have sufficient funds to maintain and operate environmental monitoring infrastructure. BASELINE: Annual O&M budgets for weather and climate monitoring institutions are approximately, MoWRE: USD 223,000, RSA: USD 100,000 and SMA: 300,000.	pastoralists (SRFP) with access to MF and 45,000 SRFP with access to MF/WII 2. TARGET: 30% increase in domestic financing for equipment/product operation and maintenance across all institutions (SMA, RSA, MoWRE, ARC)	2. Ministry budget lines for recurring costs	Sudan does not have enough government financing to continue monitoring/research and will not be able to consider recurring O&M/training costs in government budget lines ASSUMPTION 1 Capacity for long-term planning and costing will be built in all information production agencies ASSUMPTION 2 There is sufficient political support and will within the relevant institutions to reinforce existing capacities for successful execution and implementation of the project.

	Indicator	**Baseline**	**Targets** **End of Project**	**Source of verification**	**Risks and Assumptions**
Outcome 1[13] Institutional and technical capacity	1.% increase in coverage for climate/weather monitoring in each	1.Currently, weather and climate monitoring coverage in the target States is limited.	1. TARGET: Meteorological stations: 13	1.Review of budget spent on equipment procurement and rehabilitation and data held on servers to show that new	RISK 3 Limited comprehension of weather/climate information and

[12] *Objective (Atlas output) monitored quarterly ERBM and annually in APR/PIR*

[13] *All outcomes monitored annually in the APR/PIR. It is highly recommended not to have more than 4 outcomes.*

for climate observation, forecasting and early warning strengthened at national and local levels	of the 6 target states BASELINE: On average1-3 weather stations and 30 rain gauges are located in each target state 2.% of rain-fed farmers and pastoralists with access to improved weather/climate information and early warnings (disaggregated by gender). 3.Frequency of forecast bulletins provided BASELINE: seasonal; daily	Most equipment is manual and up to 40% of equipment is not-functional. A BASELINE of what is operational includes in the 6 target States includes the following: Meteorological stations: 28 manual, 32 automatic Hydrology equipment: 17 water level, 4 manual and 1 automatic flow meters Rain gauges: 98 manual 2.There are existing regional and community-based EWS initiatives for food security, however, a national alert system concerned with extreme hydro-meteorological phenomena is lacking. There is also a limited understanding of technical weather/climate information jargon (e.g., alerts are not translated into all national dialects). There is also no formalized communication mechanism for alerts and weather/climate information. End-users cannot provide	additional automatic weather stations Hydrology equipment: An additional 8 water level, 3 manual and 2 automatic flow meters Rain gauges: An additional 162 manual rain gauges 2. 50 % increase in population who have access to improved EWS/CI TARGET: % Women who receive EWS alerts/CI in target states: 8% % Men who receive EWS alerts/CI in target states: 15% 3. TARGET Localized daily and seasonal bulletins for each state Development of at least 2 tailored bulletins and presentation of market research plan	equipment is operational 2. a) Gender disaggregated survey on receipt of alerts b) Record of debriefings by HAC post extreme weather events c) HAC/SMA record of end-user feedback 3. SMA forecast and bulletin archives	agricultural advisories ASSUMPTION 3 SMA has experience in providing forecasts to the farmers. Extension Services will be used to simplify and translate all messages into simplified and local languages for each target state RISK 4 Data sharing is hindered by lack of coordination / willingness of agencies to share data or by technical constraints (e.g., bandwidth issues or local mobile telecommunication networks) ASSUMPTION 4 A cloud data portal for all relevant Stakeholders will be created to facilitate cross-sectorial knowledge sharing cross RISK 5 Trained, qualified engineers/technicians leave for more lucrative positions (“brain drain”). Unavailability and limited sustainability of requisite human resources and technical/operational capacities

		feedback to improve the communication process. BASELINE % Women who receive EWS alerts/CI in target states: 5% % Men who receive EWS alerts/CI in target states: 10% 3. BASELINE Bulletins are currently produced seasonally and daily. However, these forecasts are not sufficiently down-scaled to give localized forecasts/advisories per state.	on how to implement mobile phone based agricultural advisories, both supporting targeted weather/climate service delivery		ASSUMPTIONS 5 Personnel will be supported through international, regional and south-south cooperation knowledge sharing opportunities The Government will assist with recruitment and will mandate that trained personnel must remain working within their respective institution for 2 years in order to transfer knowledge. Sufficient qualified personnel within the NHMS will be available to handle the new equipment/models, data transmission/storage/treatment to prevent continuity breaks in monitoring. RISK 6 Natural disasters (e.g., floods, strong winds) may damage infrastructure. ASSUMPTION 6 Robust infrastructure will be procured and training will be provided for repair and maintenance with the provision of spare parts in each technical, information production agency.
Outcome 2 Residual climate risk to rural	1. At least 1 WII product created for rain-fed farmers / pastoralists	1. Weather Index Insurance is a new concept in Sudan which has never been	1. TARGET: 1 WII product piloted in 1 state	1. Insurance company product log 2.	ASSUMPTION 7 Insurance companies will have the experience and knowledge to

livelihoods in the states of greatest rainfall variability addressed through parametric insurance products	2. % increase in the number of market outlets and insurance agents in the rural areas to disseminate MF / WII products 3. Average speed of claim resettlement in all 6 States over the past 10 years 4.Claims ratio in all 6 States over the past 10 years	piloted. Rain-fed farmers and pastoralists in some states are familiar with micro-insurance via the Connecting Farmers to Market project. However, unclear compensation criteria and long approval and compensation processes deter farmers and pastoralists to purchase the insurance products. BASELINE: WII products have never existed in Sudan 2. Rain-fed farmers and pastoralists are unaware of insurance and financial services because they are located in remote areas. Only Shiekan and Al-Tawania insurance agencies have state presence in the capitals and are familiar with how to cover risks experienced by farmers and pastoralists. For instance, Al-Tawania has been managing the micro-insurance scheme in the Connecting Farmers to Market project. Shiekan Insurance provided approximately 40,000 SRFP with crop and/or livestock insurance in 2011 in the Blue Nile, White Nile, N.	2. TARGET: At least 4 insurance agents per State who are trained on WII and can provide training to Farmer/Pastoral Trade Unions, Extension Services and lead farmers 3. TARGET: Average speed of claim resettlement in all 6 target states by the end of the project is 15 days 4.TARGET: Average claims ratio in all 6 target states by the end of the project is 0.8	a)Training logs for insurance companies b)Study on presence of insurance companies in rural areas 3.Insurance statistics disaggregated according to the following categories: number of rain-fed farmers covered, number of rain-fed pastoralists covered and number of women practicing rain-fed farming/pastoralism covered 4. Claim documentation specific to rain-fed farmers and pastoralists disaggregated by risk category and gender	adopt and adapt the WII to new crops and data because they will be implicated in the design. Also, there is ample budget and time to train insurance agents on the WII product and to obtain feedback from rain-fed farmers and pastoralists. Legal and regulatory frameworks will also be adapted to facilitate the development and delivery of WII. RISK 8 Targeted farmers and pastoralists are sceptical and unwilling to engage into the index-insurance scheme and unable to pay for the product. ASSUMPTION 8 The project will familiarize the target communities on index-insurance that will be designed in a way that is affordable to the target community. Index insurance has lower administrative costs because there are no on-site inspections or individual loss assessments to perform. Costs will be minimized over time through planning of optimal (adaptation oriented) inputs and as yields rise. In addition to lower costs, rain-fed farmers and pastoralists will be more willing to accept the

		Kardofan, N. Darfur, S. Darfur and W. Darfur states. Shiekan's network of 70 branchess and offices facilitates insurance product marketing and deployment. Nonetheless, these agencies are offering traditional insurance services with long approval and compensation processes. It is therefore necessary to increase rural farmer/pastoral access to WII insurance services. <u>BASELINE</u>: 1 insurance market outlet per state 3. According to Shiekan Insurance and Re-insurance Co. in 2012, over the past 10 years, the average time elapsed between the reported damage and the payment received, <u>BASELINE:</u> Average speed of claim resettlement in all 6 target states over the past 10 years was 35 days 4. The actual value of the insurance compared to its cost or the Claims Ratio, is a good indicator if the insurance product is			insurance products because the regulatory framework for compensation criteria will be updated so that compensation can become clear and streamlined. ASSUMPTION 9: There will be no delays for insurance compensation which could hinder next year harvests. ASSUMPTION 10: Reinsurance companies will be willing to back high-risk small holder rain-fed farmers and pastoralists as experience has shown through the Connect to Farmers to Market project and the dissemination of micro-insurance with reinsurance support

		appropriately priced. According to Shiekan Insurance and Re-insurance Co.: BASELINE: Average claims ratio over the past 10 years in all 6 States was 0.62			
Outcome 3 Improved access of vulnerable farmers and pastoralists to financial services for climate change adaptation and disaster risk reduction	1. Design and application (pilot testing) of at least 3 loan products for adaptation farming and livestock production which provide flexible payment schedules for farmers and pastoralists dependent on rain-fed practices 2.One policy has been designed and agreed upon by all loan providers to mandate the adoption of adaptation technologies to be provided to rain-fed farmers/pastoralists 3.Number and type of adaptation technologies linked with microfinance services adopted by rain-fed farmers/pastoralists (disaggregated by gender to study	Current Microfinance (MF) outreach serves 400,000 clients (out of a potential 6 million). Only 23% of the total MF clients are located in rural areas, and only 6% of rural and nomadic households in the target states are currently clients (excluding the River Nile State). Stakeholder consultations in the 6 target states indicated that rural populations limit taking out loans from MFIs due to lack of collateral and lack of knowledge/understanding on the bureaucratic procedures and regulations. They also found that the existing products were not flexible during periods when no income could be gained (e.g., planting period). BASELINE: There are currently no MF products geared specifically towards	1. TARGET: At least 3 flexible MF products developed which are geared towards the needs of rain-fed farmers and pastoralists 2. TARGET: One policy developed mandating the adoption of adaptation technologies for microfinance products tailored to rain-fed farmers and pastoralists 3. TARGET: At least 3 adaptation technologies adopted by rain-fed farmers and pastoralists in the target states with 1 of these technologies targeting women or youth 4. TARGET: 10% increase in	1.Log of MF products offered and adapted by rain-fed farmers and pastoralists (CBS, SMDC) 2. Review of MF policies (CBS) 3.Log of MF products (CBS, SMDC) and adaptation technologies offered and adapted by rain-fed farmers and pastoralists (RSA) 4. Baseline survey and end of project survey noting the yield/productivity/income of rain-fed farmers and pastoralists in the target regions comparing those who have adopted MF/WII/ Adaptation Technologies/Products/Packages with those who have not.	RISK 11 The existence of other informal rural credit programmes which provide more flexibility but which are not linked to adaptation ASSUMPTION 11 Informal microfinance is practiced by local merchants and community members. Informal loans are small in quantity and scale because lenders generally receive personal guarantees rather than real collaterals. As such, informal loans are not geared to assist large populations nor to assist in cases of dispute or non-repayment due to the absence of a legal framework. This project will provide the legal and regulatory frameworks to have flexible and tailored loan products and will be able to serve larger populations. Most importantly, the new loans are likely to get better returns because the loans will be linked

	women separately) 4.% increase in the productivity and income of rain-fed farmers and pastoralists who use adaptation options/packages linked with MF/MI (as compared with non-participating farmers/pastoralists)	SFFP in terms of flexible payment schedules and reasonable collateral requirements. Another issue is that MF is not presently linked with adaptation technologies which have been proven to improve productivity and increase resilience to extreme weather for rain-fed farmers/pastoralists. <u>BASELINE:</u> There are no policies which mandate a link between MF and adaptation technologies and therefore no formalized means to build the climate resilience of farmers and pastoralists so that they can be more productive and capable of paying back loans. The lack of adaptation technologies has been addressed by the LDCF1 project which has provided rainwater harvesting know-how and materials. Also, the Agricultural Research Corporation (ARC) has significant experience in improving crop and livestock production by developing	yield and/or income for rain-fed farmers and pastoralists who have access to improved financial services linked with adaptation technologies		with adaptation technologies.

		tailored products for farmers and pastoralists (e.g., equipment for irrigation and dryland improvement). ARC acts as the technical, operational arm of the Ministry of Agriculture and is the authorized body for crop variety release and seed certification (such as in IFAD's Seed Development Project). ARC also has strong collaborations with Extension Services and Farmer Field Schools. However, in spite of its strong technical capacity, ARC has limited financing to demonstrate best practices and up-scale its proven adaptation technologies in the rural regions. <u>BASELINE:</u> Consequently, other than in regions covered by the LDCF1 (first NAPA project), SRFPs do not have access to any adaptation technologies or packages. <u>BASELINE:</u> Without access to adaptation technologies farming and pastoral production for smallholders			

		is currently limited.			

ANNEX B: RESPONSES TO PROJECT REVIEWS (from GEF Secretariat and GEF Agencies, and Responses to Comments from Council at work program inclusion and the Convention Secretariat and STAP at PIF).

During the PIF stage, the GEF Council recommended the following:

#17, By CEO Endorsement please identify public participation Stakeholders including CSOs and indigenous people and provide details on their roles.

189. During project development, key public participation Stakeholders including CSOs and indigenous people were identified. They will continue to be implicated during project implementation. Their expected roles are indicated below.

CSO involvement during project implementation

Farmer's Trade Union in each State	- Identify the types of crops grown and the types of livestock raised and the production systems being followed by participating farmers - Select farmers who will be willing to collaborate to undertake technology field evaluation on his/her farm and provide an on-farm demonstration site to train other farmers in improved technologies and best practices - Facilitate the formation of Community Based Organizations to lead project implementation in the targeted village clusters - Participate in one or more Community Orientation/Mobilization meeting(s) in each of the villages - Participate in project planning for community level activities, focusing on agriculture - One representative from the Trade Union will be involved in the Technical Committee for each State
Pastoralist's Trade Union in each State	- Identify the types of livestock raised and the production systems being followed by participating pastoralists - Select pastoralists who will be willing to collaborate to undertake adaptation and dry-land technology field evaluations - Facilitate the formation of Community Based Organizations to lead project implementation in the targeted village clusters - Participate in one or more Community Orientation/Mobilization meeting(s) in each of the villages - Participate in project planning for community level activities, focusing on pastoralism - One representative from the Trade Union will be involved in the Technical Committee for each State
Practical Action	- Inform community members about the main aspects and implementation modalities of the Project, including the importance of community participation in all stages of the entire project development process - Discuss the project interactions and some of the linkages with other projects (e.g., the LDCF1 project or planned NAP initiatives)

	- Assess the community's interest to participate actively in the entire project development process and the willingness to become responsible for the implementation and management of the project development - Discuss the need to form a representative Community Based Organization.
Youth/Women Society Organizations (Women's Union of Kassala, Sudanese Youth Union)	- Facilitating the community participatory planning process to implement activities, focusing on the involvement of women and children - Establish community rules and regulations by which the community cooperatives receive and pay back borrowed money for different adaptation purposes - Support women's involvement in microfinance promoting awareness of successful national initiatives for women such as ABSUMI - Participate in gender-disaggregated assessments and site identifications for community adaptation interventions - Serve as a permanent focal point with the State Technical Committee - Nominate one gender focused representative to take part in each State Technical Committee
Sudanese Climate Change Network	- Review and test of community based early warning system strategies, DRR preparedness and adaptation options - Documentation of adaptation and DRR good practices and relevant local innovations - Conduct awareness sessions at different levels including with local farmers and pastoralist communities to raise their knowledge by the project objectives, linkages and how to maximize their benefits - Facilitate meteorological data collection and early warning dissemination to improve seasonal rainfall forecasts and climate services - Facilitate vulnerability assessments and baseline surveys at community levels using participatory approaches and methods - Conduct capacity building workshops at community levels on the use of weather/climate information agricultural advisories - Build good linkages with other related regional and international projects, interventions and NGOs organizations particularly Pan African for Climate Change justice Network (PACJA)
MASAR (pastoralist NGO)	- Facilitate project intervention in the targeted states for pastoralists regarding: o Formation of pastoral organizations o Identifying training needs / gaps o Planning adaptation measures o Facilitating access to microfinance o Supporting the study to determine the need and feasibility of WII for pastoralists

ANNEX C: STATUS OF IMPLEMENTATION OF PROJECT PREPARATION ACTIVITIES AND THE USE OF FUNDS[14]

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

B. PROVIDE DETAILED FUNDING AMOUNT OF THE PPG ACTIVITIES FINANCING STATUS IN THE TABLE BELOW:

PPG Grant Approved at PIF: **100,000**			
Project Preparation Activities Implemented	***GEF/LDCF/SCCF/NPIF Amount ($)***		
	Budgeted Amount	***Amount Spent To date***	***Amount Committed***
1. Local consultants	24,000	7,179.51	0
2. International consultants	60,000	18,189.00	0
3. Travel	10,000	10,677.67	0
4. Technical workshops	6,000		
5. Management			
6. Consultancy Firm		35,000	0
7. Service Contracts-Individuals		15,433.12	0
8. Bank Charges		66.55	0
9. Sundry		181.16	0
10. Learning - training of counterparts		13,272.59	0
11. Services – Companies (committed but not paid)			
12. NEX Advance (not liquidated)			
Total	100,000	99,999.60	0

[14] If at CEO Endorsement, the PPG activities have not been completed and there is a balance of unspent fund, Agencies can continue undertake the activities up to one year of project start. No later than one year from start of project implementation, Agencies should report this table to the GEF Secretariat on the completion of PPG activities and the amount spent for the activities.

ANNEX D: 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)

Not applicable

United Nations Development Programme

Country: Sudan

PROJECT DOCUMENT[1]

Project Title: Climate Risk Finance for Sustainable and Climate Resilient Rain-fed Farming and Pastoral Systems

UNDAF Outcome(s):

UNDAF Pillar 1 Outcome 1 People in Sudan, with special attention to youth, women and populations in need, have improved opportunities for decent work and sustainable livelihoods and are better protected from external shocks, thereby reducing poverty.

UNDAF Pillar 1 Outcome 2 Populations vulnerable to environmental risks and climate change become more resilient, and relevant institutions are more effective in the sustainable management of natural resources.

UNDP Strategic Plan (2014-2017) Environment and Sustainable Development Primary Outcome:

Countries are able to reduce the likelihood of conflict, and lower the risk of natural disasters, including from climate change;

UNDP Strategic Plan (2014-2017) Secondary Outcome:

Growth and development are inclusive and sustainable, incorporating productive capacities that create employment and livelihoods for the poor and excluded;

Expected CP Outcome(s):

Livelihoods options and opportunities for rural and urban communities enhanced to accelerate economic reintegration, employment creation and long-term recovery and equitable development.

Climate resilience of communities and ecosystems strengthened;

Expected CPAP Output(s):

CPAP Focus Area 2, Output 1: Needy communities to climate change and climatic risks adapted comprehensive sets of adaptation measures.

CPAP Focus Area 2, Output 3: Environmental governance policies and regulatory frameworks for enabling better natural resources and risk management developed.

[1]For UNDP supported GEF funded projects, as this includes GEF-specific requirements

Executing Entity/Implementing Partner:

The Higher Council for Environment and Natural Resources.

Implementing Entity/Responsible Partners:

Ministry on Environment, Forestry and Physical Development (MEFPD),
Ministry of Science and Communication (MSC),
Ministry of Water Resources and Electricity (MoWRE),
Ministry of the Interior (MoI, both State and National levels), Ministry of Agriculture (MoAg, both State and National levels),
Central Bank of Sudan,
Insurance Advisory Authority.

Brief Description

As climate change evolves, and floods and droughts become more severe and frequent in Sudan, there is a need to find approaches, which can reduce the sensitivity of farmers and pastoralists to increasing rainfall variability. Smallholder rain-fed farmers and pastoralists are particularly vulnerable to climate change and are in desperate need of risk reduction measures. However, limited financial services are available to this high-risk population, to provide them capital for resilient-building activities and insurance companies have failed to provide coverage during extreme weather events. This project will address these issues by supporting the development of a range of financial mechanisms to incentivize investments in climate change adaptation and risk reduction measures in six vulnerable agro-ecological regions of Sudan. To effectively monitor extreme weather risks, LDCF resources will support efficient, robust collection and interpretation of weather/climate information for risk mapping, rainfall forecasting and drought early warning. Simultaneously, funds will be used to support the development of Sudan's first Weather Index Insurance products, which will be strategically combined with microfinance services supporting adaptation-oriented agricultural and livestock practices. To ensure sustainability with these tasks, it is necessary to build the capacity of the National Hydro-Meteorological Services to have the technical and operational capacity to maintain equipment and models long-term. Similarly, regulatory frameworks for financial services must be updated and capacities within the financial/insurance institutions must be built to target small-holder rain-fed farmers and pastoralists. In particular, insurance products must be designed to address residual climate risk, while microfinance products must take into account seasonal payment schedules and pastoral mobility. The timing is right to develop such products because credit services can take advantage of the current legal frameworks and national strategies promoting microfinance services for agriculture in addition to the large amounts of lending capital available. Furthermore, by gaining experience in Weather Index Insurance and recognizing the importance of continuous weather/climate observations, both public and private insurance sectors will serve as important catalysts in supporting sustainable environmental monitoring.

Programme Period:	2014-2018
Atlas Award ID:	00078764
Project ID:	00088863
PIMS ID:	4591
Start date:	March 2014
End Date:	June 2018
Management Arrangements	NIM
PAC Meeting Date	5 Dec 2013

Total resources required	$ 24,500,000
Total allocated resources:	$ 24,500,000
• GEF/LDCF	$ 5,700,000
• Government (In-kind)	$ 15,000,000
• UNDP (Cash)	$ 600,000
• Private	$ 3,200,000

Agreed by (Government):

Date/Month/Year

Agreed by (Executing Entity/Implementing Partner):

Date/Month/Year

Agreed by (UNDP):

Date/Month/Year

TABLE OF CONTENTS

List of Acronyms

ARC	Agricultural Research Corporation
ABS	Agricultural Bank of Sudan
CBOS	Central Bank of Sudan
CPAP	Country Program Action Plan
CPD	Country Program Document
CSO	Civil Society Organization
GDP	Gross Domestic Product
GPRS	General Packet Radio Service
EWS	Early Warning System
HAC	Humanitarian Aid Commission
HCENR	Higher Council on the Environment and Natural Resources
HDI	Human Development Index
IFAD	International Fund for Agricultural Development
LDCF	Least Developed Countries Fund
LEAP	Livelihoods, Early Assessment and Protection
MoAg	Ministry of Agriculture
MEFPD	Ministry on Environment, Forestry and Physical Development
MF	Microfinance
MFI	Microfinance Institute
MI	Micro-Insurance
MoI	Ministry of the Interior
MSC	Ministry of Science and Communication
MoWRE	Ministry of Water Resources and Electricity
NAPA	National Adaptation Programme of Action
NDVI	Normalized Difference Vegetation Index
NGO	Non-Governmental Organization
NHMS	National Hydro-Meteorological Service
OCHA	Bureau de la Coordination des Affaires Humanitaire
PAR	Portfolio at Risk
PDNA	Post Disaster Needs Assessment
PRSP	Poverty Reduction Strategy Paper
RSA	Remote Sensing Authority
SMA	Sudan Meteorological Authority
SMART	Standardized Monitoring and Assessment of Relief and Transition
SMDC	Sudanese Microfinance Development Corporation
SMS	Short Message Service
SRFP	Smallholder Rain-fed Farmers and Pastoralists
TAMSAT	Tropical Applications of Meteorology using Satellite data and ground-based observations
TOR	Terms of Reference
TOT	Training of Trainers
UNEP	United Nations Environment Programme
UNDAF	United Nations Development Assistance Framework
UNDP	United Nations Development Programme

UNISDR	United Nations International Strategy for Disaster Reduction
USD	United States Dollar
WFP	World Food Program
WII	Weather Index Insurance
WMO	World Meteorological Organisation

1 SITUATION ANALYSIS

1. Approximately 60 percent of Sudan's rural households are dependent on traditional, rain-fed farming and pastoral practices. Rain-fed farming is the major agricultural production system in Sudan and contributes appreciably to the countries crop production (mainly millet, sorghum, groundnut and sesame) and gross domestic product (40%). Similarly, pastoralism contributes approximately 25% to the GDP and provides over 20% of the country's foreign exchange earnings[2].

2. In spite of its importance, the productivity of rain-fed farmers and pastoralists is decreasing dramatically. Sudanese agricultural and livestock sub-sectors are characterized by declining yields due to their vulnerability to extreme weather and climate risks. Smallholder farmers and pastoralists in rain-fed areas are particularly vulnerable to current climate variability and future climate change. Typically, such farmers and pastoralists are living in conditions of persistent poverty, relying on rainfall and traditional practices (e.g., grazing in grasslands). This combination renders them highly vulnerable to climate variability, as evidenced by widespread suffering in rural areas during past droughts, as well as floods[3]. Indeed, the vast country of Sudan (third largest in Africa) encompasses five different climate zones, which are characterized by high variability in temporal and spatial rainfall (Annex 9c). An increase in rainfall variability has been responsible for more frequent and severe floods and droughts, as well as desertification (in the North).

3. Extreme weather has caused negative impacts on key socio-economic sectors including the loss of life, damage to property and infrastructure and has limited food, energy (hydroelectric power) and potable water supplies. Repeated floods have occurred approximately every 3 years on average with the worst flood in 2007, costing Sudan 300 million USD and affecting 565,000 people. Most recently in July-August 2013 the flood affected 47,000 families, killing 56 people and 36,000 heads of cattle and damaging 8,400 ha of cultivated land.

4. The impacts of climate change and climate variability on pastoral and nomadic groups in the semi-arid areas of Sudan are worsening and causing clashes between nomads and farmers. Severe drought events in 1983/84 -1987 and 1990/91, 2000 and 2003 resulted in declines in livestock populations by 60 to 70 percent in some areas of Sudan (in addition to affecting at least 8 million people during each event). The situations of drought, desertification and scarce resources have been factors behind prolonged stays of nomads in areas of agricultural production ("Talq"), which has caused clashes between nomads and farmers.[4] Clashes are worsening with climate change, because it has caused farmers to intensify continuous cultivation (limit fallow periods), expand land use, construct more fencing and abandon previous mutual interdependencies between cultivation and pastoralism (e.g., manurism, sharing of crop residues, animal transport of crops)[5]. Consequently, there have been complete changes in ways of animal husbandry and migration patterns, and livestock production remains consistently low[6].

[2] Sudan Council of Ministers (SMA report)

[3] The flood in 1997 caused 201 deaths and 1,425 people were affected by the spread of vector diseases (e.g., the Rift Valley Fever). Similarly, the impacts of the floods in Sudan during the rainy season of 1999, reported: 492,699 losses of livestock and 150,000 cases of malaria cases. Also, during hot and dry periods, Sudan becomes victim to the spread of vector-borne diseases including meningitis in 1965 and 1998 and cholera in 1966. (Source: Higher Council of Civil Defense which is composed of different related ministries including Ministry of Health).

[4] *Land Issues and Peace in Sudan*, Sudanese Environmental Conservation Society (SECS) and UNDP November 2006.

[5] Feinstein/UNEP Study, 2013, *Standing Wealth: Pastoralist Livestock Production and Local Livelihoods in Sudan.*

[6] In some areas, herders are forced to migrate further to find grazing, and this is now taking them into the pest-infected areas.

5. Furthermore, farmers and pastoralists are faced with pest infestations, epidemics and market risks. For instance, farmers and pastoralists have had to deal with fluctuating prices within and between seasons, due to adjustments in local or world markets (e.g., currency devaluations). The drought in 2000 is a prime example, as it reduced food stocks and caused prices to rise three-fold (Zakieldeen, 2007). The agricultural/livestock sector has more recently been negatively impacted by renewed trade sanctions by the United States and the secession of the Republic of South Sudan (in 2011), the latter of which caused inflation to reach over 46%.

6. All such risks are exacerbated by inappropriate agricultural practices, weak support services and an inefficient credit system[7]. Indeed, due to the risks associated with a changing climate and unstable markets, financial service providers (banks, microfinance institutions, and insurance companies) are discouraged from lending to farmers and livestock owners. As a result, smallholder rain-fed farmers and pastoralists have very limited access to finance and improved opportunities to improve their production. This has prevented investments in land preparation, the ability to have climate-resilient production practices (e.g., rainwater harvesting) and has kept many families (especially single female headed households) in continuous cycles of poverty and food insecurity[8]. Consequently, farmers and pastoralists have had trouble entering markets, have poor access to inputs and lack critical agricultural/livestock advisory- and extension services.

7. On a national level, such impacts and associated risks have made it difficult for institutions to plan for food security, epidemics and water resource management. In fact, Sudan is currently the location of food aid's largest operation by the World Food Programme. Farmer and pastoralist communities in regions of highest rainfall variability largely depend on humanitarian aid to buffer risks in phases of drought and post-disaster recovery. However, humanitarian aid is often not timely, or effective, because it is not mobilized around pre-established climate signals. Furthermore, the financial resources and capacities of the government to repeatedly finance humanitarian relief after extreme climate events (especially drought disasters) are insufficient and donor funds keep being strained. In effect, there is increasing recognition that 'ex-post' funding is not only insufficient, but that it is often inefficient, poorly targeted, unsustainable, and slow.

8. Without any intervention, difficulties in planning are predicted to continue and worsen (Second National Communication to the UNFCCC); the boundary between semi-desert and desert[9] defining humid, agro-ecological zones is expected to shift southward thereby decreasing the land available for agriculture and husbandry[10]. Similarly, climate predictions indicate that the average temperature will rise significantly, average rainfall could decrease by 5% during the rainy seasons, and increased rainfall variability is likely to increase flood risk throughout the country[11].

1.1 Problem Declaration

9. Smallholder rain-fed farmers and pastoralists (SRFP) no longer have adequate means to reduce their sensitivity to climate change, extreme weather, market adjustments and other associated risks described above. Beyond a lack of reliable rainfall forecasting and early warning in rain-fed areas, smallholder farmers and pastoralists lack a sufficient earnings and capital base to make their livelihood systems more resilient to highly variable climate risks. There is thus a need to apply alternative, proactive approaches to increase the productivity of farmers and pastoralists, so that they can become more resilient

[7] Sudan Vision, An Independent Daily, 19 Sep 2013, article by Kidani, Alula Berhe.

[8] http://www.cgap.org/blog/innovations-islamic-microfinance-small-farmers-sudan.

[9] Since the 1930's, there has been an estimated 50 to 200 km shift southward of the boundary between desert and semi-desert.

[10] UNEP (2007) Sudan – Post Conflict Environmental Assessment; Government of Sudan (2007) NAPA

[11] Feinstein/UNEP Study, 2013, *Standing Wealth: Pastoralist Livestock Production and Local Livelihoods in Sudan.*

to risks and escape a downward trend towards extreme poverty, and dependence on humanitarian aid post extreme events.

10. While autonomous efforts to manage and diversify climate risk are on-going in Sudan (e.g., the first LDCF-funded project, which is promoting adaptation technologies for agriculture and water), SRFP have limited access to capital and remain trapped in low-productive survivalist practices that are highly sensitive to climate change. The high risk status of rain-fed climate sensitive farmers and pastoralists currently hinders their ability to access microfinance services, which prevents their ability to have means to more effectively engage in resilient agricultural production, develop productive livelihood capital and gain protection from covariate risks. Banks, MFIs and other financial service providers simply have no incentive to serve this high risk customer segment. Consequently, microfinance products are not designed to consider the specific needs of rain-fed farmers and pastoralists. SRFP are forced to borrow at high interest rates and purchasing loan products that have inflexible payment schedules. There is also limited access of rain-fed farmers / pastoralists to MF because they often live in remote locations that are not serviced regularly by financial outlets. Such an effect increases both the cost of lending for microfinance institutions, and the cost of borrowing for farmers. It has also led to a low awareness among SRFP in available financial service products.

11. Furthermore, the insurance industry is currently incapable of covering the risks faced by SRFP. For example, during the severe drought of 2000, the insurance industry experienced a 103% loss ratio in their livestock insurance scheme due to exorbitant rates of claims. In spite of the high potential for agricultural insurance in Sudan, evidenced by steady growth in insurance coverage, transaction costs remain too high. In addition, with traditional insurance products, premium costs are expected to increase as climate-related risks become more prevalent in scale and intensity. The net effect is that insurance coverage is enjoyed only by the wealthier segment of the agricultural sector, bypassing the most vulnerable farmers and pastoralists engaged in rain-fed agriculture and pastoralism, who are effectively trapped in climate poverty.

12. Additionally, SRFP are reluctant to enter into traditional microfinance or insurance plans for various reasons; insurance compensation criteria are not clear due to complex regulatory frameworks and convoluted dispute resolution processes. The choice of private insurance companies is also relatively low (~2) preventing competition and reduction of premiums. Similarly, microfinance services have very strict collateral requirements. This has pushed farmers and pastoralists to engage with informal lending sources, which generally have higher interest rates, but are more flexible in terms of lending requirements and repayment processes. However, informal loans are typically small in quantity and scale because lenders generally receive personal guarantees rather than real collaterals. As such, informal loans are not geared to assist large populations nor to assist in cases of dispute or non-repayment due to the absence of a legal framework.

13. Exacerbating the problem of access to financial services by SRFP is the fact that there are limited linkages between small holders and farming technologies, which can help them adapt to climate change (exceptions include previous adaptation interventions in select locations such as the first LDCF-funded project). Consequently, most SRFP are not familiar with how the technologies can help them build resilience to climate change (e.g., using rainwater harvesting to mitigate the impacts of drought). Similarly, there is no link between Microfinance/Micro-insurance (MF/MI) and weather/climate/agricultural/livestock information. Finally, on a national level, there is a lack of appropriate polices, legislation, and support to facilitate the adoption of adaptation technologies with financial services.

14. Sudan also has limited coverage of weather stations to validate insurance pay-outs when extreme weather events occur. Most States have between 1 and 3 weather stations. However, according to recommended WMO standards (one station covering a 20 km radius), in some states hundreds of rain gauges are needed to be installed for full coverage. Similarly, national satellite image production institutes

have limited means to validate crop yields, as they have in the past; image data licenses have expired and freely available satellite images do not have fine enough resolution to be used to validate insurance claims. Consequently, and as noted in Stakeholder consultation meetings during the project preparation phase, SRFP are consistently discontent with pay-outs and are tending to avoid using insurance schemes.

15. The combination of a limited hydro-meteorological monitoring network and satellite imaging capability with high rainfall variability, has meant that many important regions and populations vulnerable to climate hazards are not monitored (e.g., soil moisture is not monitored in drought-prone areas and intense rainfall is not monitored in areas frequently subjected to flooding). At present, Sudan is unable to effectively provide weather forecasts and climate scenarios to help with drought and flood early warning. Exacerbating this issue is that many agencies (at least 10) within Sudan are working ad-hoc and independently to produce early warnings. As a result, rain-fed farmers/pastoralists are lacking consistent, localized weather/climate forecasts/predictions and many potentially threatening hazards have not been anticipated. The most recent flood in August 2013, which made international headlines, has been a case in point where the national hydro-meteorological services were unable to predict the impact of the floods and little of the associated mass destruction was foreseen and could be mitigated.

1.2 Preferred Solution

The preferred (normative) solution in Sudan is to improve national and decentralized capacities to provide timely forecasts and early warnings, as well as complementary micro-finance and weather-based index insurance services for rain-fed farmers and pastoralists to improve their ability to manage and adapt to climate risks. Specifically, the solution will include:

- Improving weather/climate and land cover/crop monitoring capabilities to enhance flood and drought forecasting and climate services for the insurance sector;
- Revitalizing and improving targeted climate/weather and agricultural advisory services for SRFP;
- Enhancing weather/climate data sharing and communication among information production agencies, the Ministries of Agriculture/Livestock, the Disaster Risk Management Unit (HAC), MFIs, insurance companies, extension officers, farmer and pastoral trade unions;
- Designing and applying microfinance products geared towards rain-fed farmers and pastoralists, which include flexible payment schedules and collateral requirements;
- Designing and piloting weather-index based insurance products (and associated regulatory frameworks), which are suitable to the particular climate zones and farmer/pastoralist's economic and social livelihood characteristics;
- Increasing the number of credit and insurance marketing outlets in the rural areas, as well as mobile banking/insurance services;
- Linking access to credit and complementary WII services by strengthening the institutional capacities of financial service providers on national and state levels;
- Facilitating the adoption of adaptation technologies using MF/WII services and on-the-farm training (including participation by farmer/pastoralist trades unions and women's associations);
- Strengthening capacities of agencies involved with climate/weather/agricultural monitoring on technical, operational and human resource levels, emphasizing long-term budget needs; and
- Mainstreaming weather/climate monitoring into the national, state and sectorial planning in the broader context of supporting financial services and climate change risk reduction.

1.3 Barriers of the project

However, this normative solution is hindered by a number of institutional, financial, technological and informational barriers, including:

1.3.1 Insufficient coverage of weather, climate and hydrological monitoring infrastructure

16. Sudan is a vast country with five different climate zones, which makes planning and forecasting for Sudanese agriculture and pastoralism very complex. Highly variable amounts of rainfall within limited geographic areas require extensive surveillance and monitoring coverage. Monitoring is required to support the generation of reliable weather forecasts/climate predictions and timely early warnings. However, to date insufficient government budget allocations have prevented the procurement of weather stations and the purchase of high resolution satellite data. Insecurity in conflict areas such as South Darfur has also limited the amount of equipment which can be installed. Consequently, insufficient coverage has resulted in limited ability to produce reliable seasonal forecasts and early warnings. It has also decreased the incentive of microfinance institutes and insurance companies to provide financial services for rain-fed farmers and pastoralists, when yields cannot be accurately predicted and losses cannot be easily validated.

1.3.2 Challenges with cross-sectorial data sharing and institutional collaboration

17. There is currently no centralization of hydro-meteorological/agricultural data due to various institutions acting as information producers with limited technical means to transfer data efficiently between institutions. Most of the existing environmental data is not archived securely and awareness of information databases at different departments and institutions is limited. Extension services and farmer/pastoral trade unions currently have no access to environmental databases, which prevents cultivation/husbandry planning. Similarly without access, banks and insurance companies do not have yield and accurate risk information. Consequently, insurance companies are unable to gauge losses during extreme events in an objective manner, and financial institutions lack the means to tailor microfinance products for the rural sector. As concluded during Stakeholder conversations, all the information required to assess vulnerability[12] and calculate risks needs to be transparent and accessible through a centralized portal for all relevant Stakeholders.

1.3.3 Challenges in providing tailored weather/climate information and agricultural advisories

18. Currently, rural populations do not receive weather/climate/agricultural advisory information which can assist them in building resilience to climate change. Stakeholder discussions during project development indicated that forecasts/predictions need to be translated into specific hazards experienced by different sectors e.g. heat units for livestock or wind speeds for agriculture. This information should then be combined with known vulnerabilities to identify areas and communities at risk. Furthermore, the warnings are often too technical for end-users and are not translated into Arabic or local dialects. Extension services have the potential to play a role in simplifying and communicating early warnings and climate information for rural populations, however, at the moment they have limited capacity to do so.

19. Similarly, the Agricultural Research Cooperation has been developing numerous adaptation technologies which can be tailored to specific sites (e.g. rainwater harvesting equipment). In spite of the fact that the technologies undergo rigorous field testing and approval mechanisms before they are released, actual applications are limited due to a lack of financing. Consequently, rural communities are not aware of these proven technologies, which can help them adapt to climate change. Rain-fed

[12] As specified by Government of Sudan policy the use of the term “vulnerability” implicitly refers to vulnerability to climate change

farmers and pastoralists are also not familiar with how some technologies are gender-specific and can enable women and youth to more effectively contribute to farming/pastoral practices.

20. Banks and insurance companies are also unaware of the adaptation technologies. For instance, the institutions that currently provide credit services to farmers do not link lending with appropriate dry farming technologies. As a result, MFIs are increasing the risk of default on payments and are counterproductive by not exploiting the appropriate technologies to build the resilience of rural populations to climate change.

1.3.4 Long approval and complicated compensation process for existing insurance products

21. Insurance services for rain-fed farmers and pastoralists are extremely limited in Sudan. There is a lack of availability of market outlets and insurance agents in rural areas to disseminate insurance awareness and services. Furthermore, there are high administrative costs to judge compensation because parcels are often scattered and not demarcated. Also, there are limited weather stations and high resolution satellite data for monitoring and surveillance, which can be used to validate damage/losses (See Barrier 1.3.1). Consequently, insurance premiums are exorbitant for farmers and pastoralists and currently amount to 7% of the sum insured (i.e., the amount of the production loan). Furthermore, the lack of clarity and consistency in compensation criteria has deterred farmers and pastoralists to use insurance services. For instance, depending on the insurance company, regions with less than 300 mm or 450 mm rainfall are often not insurable. Also, Stakeholder consultations indicated that the window in which farmers/pastoralists are able to report damage/losses is often so limited, and the distances so long to reach Khartoum-based insurance companies that many claims are left unreported. Finally, international reinsurance support is often not possible. Often re-insurance companies refuse to insure livestock in open grazing lands and the US trade sanctions, recently re-imposed on Sudan in 2012, have deterred some major, global companies from providing reinsurance to Sudan (e.g., SwissRe).

1.3.5 No experience with Weather Index Insurance products

22. Sudanese insurance companies have no experience with Weather Index Insurance products at national or local levels. Although a previous attempt was made to develop a product, development could not be facilitated because reinsurance could not be guaranteed. Consequently, the adoption of creative insurance solutions is likely to be challenging for insurance companies. For instance, remotely sensed data-based indices are necessary when weather stations are not in the proximity of farmers/pastoralists, yet understanding and adapting such indices requires significant technical knowledge. Consequently, insurance companies, both public and private require significant capacity building. Additional and continuous capacity building will also be required in order to provide insurance companies with the knowledge to adapt WII products to new crops and data.

1.3.6 Lack of customized and understandable microfinance services for rural clients

23. The main microfinance products for banks are traditional credit products. These products are generalized to all clients and do not consider the unique needs for flexibility and adaptability for farming/pastoral clients. Also, in terms of technology, most banks rely on traditional core banking systems, which do not have the ability to access the poor in remote areas. By not customizing MF products to suit the needs of targeted rural communities, this has given an advantage to informal providers who are more flexible with their guarantee requirements and repayment processes, but also less affordable.

24. Stakeholder consultations in the six target States during the project development phase indicated that rural populations are not taking out loans from established MFIs due to lack of collateral and lack of knowledge/understanding on the bureaucratic procedures and regulations. They also found that the existing products were not flexible during periods when no income could be gained (e.g., the planting period).

25. Support for developing customized MF products is also limited in Sudan, because training programs for MFIs are infrequent and the capacity of Microfinance service providers to develop new products is weak.[13] Furthermore, extension and Business Development Services (BDSs) require studies on how to improve value chains in order to properly develop sustainable MF products.

1.3.7 Poor long-term sustainability of observational infrastructure and technically skilled human resources

26. The maintenance of monitoring equipment, the human capacity to use, maintain and repair this equipment, process data and develop forecasts and advisories, all require sustainable financing mechanisms and capacity development. Costs to support operation and maintenance, as well as salaries and capacity building for technical public servants within the NHMS, are recurring annual expenditures which require planning and budgeting. At present, the NHMS often struggle to pay for the maintenance and upgrade of existing equipment[14] due to poor long-term budget planning. Insufficient and inconsistent budgeting has led to the inability of the Sudan Meteorological Authority, SMA, to rehabilitate four radars previously in the country, and explains why approximately 40% of the hydrological equipment is currently not operational.

27. Moreover, there is no link with the NHMS and insurance companies to support systemic use of weather/climate data and support for continuous monitoring. Weather/climate monitoring data is required for risk management (e.g., for index product creation, pay-out validation). However, NHMS is unaware of the private demand for data, particularly how much the private insurance sector is willing to pay for tailored data services. Knowledge sharing is required between the institutions so that data on covariate risks (such as severe drought) can be fully exploited to assist with private sector demands. By generating revenue-bearing products, the NHMS has the potential to use the funds for equipment upkeep, operation and maintenance as well as license renewals, thereby enabling monitoring sustainability.

28. Additionally, qualified human resources at all levels are required so that adequate technical expertise is available for equipment maintenance/operation and data analysis/modelling/forecasting. Running forecast models and analysing satellite data is a highly skilled task and requires many years of education and training. However, in Sudan, training for technicians is one of the main limiting factors to maintain equipment and continue model simulations as well as to gain experience with new technological developments.

2 STRATEGY

29. No single initiative can completely remove all of the barriers aforementioned. Nonetheless, this project (hereafter referred to as the LDCF2 project[15].) will work in conjunction with other adaptation and microfinance/insurance-related initiatives to build off of their advances in removing these barriers.

30. The LDCF2 project aims to address the above barriers by achieving the following three outcomes:

31. Outcome 1 of the project will build institutional and technical capacity for climate observation, forecasting and early warning.

[13] Mapping, Capacity Assessment and Capacity Development of Microfinance Providers in Sudan (PACT, UNDP 2012).

[14] See WMO Global Framework for Climate Services.

[15] Note that with the approval of this project, Sudan will have two (2) initiatives under implementation and financed by the LDCF that are based on the priority project profiles identified in the country's NAPA. To avoid confusion, the first LDCF-funded NAPA follow-up project will be referred to as the **LDCF1** project, and the proposed project on Climate Risk Finance will be referred to as the **LDCF2** project.

32. Outcome 2 will address climate risks faced by rural populations in the states of greatest rainfall variability by developing parametric insurance products.

33. Outcome 3 will improve access of vulnerable farmers and pastoralists to financial services for climate change adaptation.

34. By achieving these outcomes, the project will strengthen the capacity of national and sub-national entities to monitor climate change, generate reliable hydro-meteorological information (including forecasts) and combine this information to facilitate the development and delivery of targeted financial services for smallholder rain-fed farmers and pastoralists (SRFP). It will also build financial service capacities to tailor products to the SRFP. On a local level, the project will help Sudanese communities (particularly the most vulnerable ones, targeting women) to build resilience to climate-induced impacts by facilitating their access to tailored credit services to purchase adaptation technologies/packages and providing them with insurance services to cover residual risk during extreme weather. Furthermore, the project includes complementary provision of targeted and timely seasonal forecasts, early warnings and agricultural advisories, which will assist SRFP in planning, risk mitigation and prevention.

2.1 Project rationale and policy conformity

35. The Government of Sudan became a signatory to the United Nations Framework Convention on Climate Change (UNFCCC) in 1993. Sudan's Initial National Communication (INC) was submitted to the UNFCCC in July 2003 and provided an assessment of the likely impacts of climate change on several sectors, highlighting the importance of adaptation measures for rain-fed farming and pastoral systems. The INC identified agriculture, water and health as the highest priority sectors. The INC concluded that climate change, including decreasing annual rainfall, increasing rainfall variability and increasing average annual temperatures, was causing challenges such as a reduction in ecosystem integrity, a decrease in biodiversity, a decline in crop yields and an increase in disease outbreaks and insect infestations. These challenges have led to increased risks of food shortage and famine, in addition to an increase in poverty. Similarly, Sudan's draft Second National Communication (SNC) includes projections which demonstrate that climate change will highly impact water resources and pastoralist livelihoods who are dependent upon water.

36. During 2005 – 2007, the Government of Sudan, with support from GEF/LDCF and the United Nations Development Programme, prepared its National Adaptation Plan of Action (NAPA, 2007). Submitted to the UNFCCC in July 2007, the NAPA identified urgent adaptation initiatives to reduce the increasing vulnerability of the rural communities to current and future climatic risks. Consistent with guidance for the LDCF (GEF/C.28/18, 2006), the NAPA process also yielded a consensus that the highest priority NAPA follow-up interventions should be a programme of adaptation interventions in five distinct areas, with a major focus on the enhancement of food security by building the adaptive capacities of the rural population, particularly of rain-fed farming and pastoral communities. The NAPA specifically prioritises adaptation support to rain-fed farmers and pastoralists, as it states that "In many parts of Sudan, rain-fed farmers and pastoralists have devised numerous kinds of coping strategies to deal with agricultural production in the face of climatic variability. With the advent of changes in climatic patterns in recent decades, many of these strategies are proving to be no longer effective."

37. The current Project – "Climate Risk Finance for Sustainable and Climate Resilient Rain-fed Farming and Pastoral Systems" (hereafter referred to as LDCF2 project[14]) – responds directly to the NAPA and addresses several of the highest NAPA priorities. Identified among adaptation needs according to NAPA, section 3 - Identification of Adaptation Needs is enabling the introduction to micro-credit to support adaptation activities. The project will support NAPA priorities through the provision of micro-finance services that are better tailored to addressing climate risks and other innovative risk finance instruments, such as index insurance, to help pastoralists and farmers to better manage covariate risk in rain-fed agriculture.

38. Overall, in implementing priority interventions identified in the NAPAs, the project is consistent with the Conference of Parties (COP-9) and also satisfies criteria outlined in the UNFCCC Decision 7/CP.7 and GEF/C.28/18. The project has been endorsed by the national UNFCCC and GEF focal points.

39. Furthermore, the project is aligned with Sudan's National Adaptation Plan that has been developed as part of a multilateral environmental agreement (MEA) to combat desertification and preserve biological diversity. Similarly, it supports 3 of the 9 Millennium Development Goals (MDGs), namely:

- MDG1: Eradicate Extreme Poverty and Hunger.
- MDG3: Promote Gender Equality and Empower Women.
- MDG7: Ensure Environmental Sustainability.

40. The Sudanese government's new Five-Year Plan (2012-2016) also makes strong references to achieving the MDGs in Sudan. Similar to previous plans since 2004, the Five-Year Plan's continued objectives include (a) public investment in infrastructure; (b) focusing on small-scale farmers in rain-fed farming areas; (c) development of crop insurance programs; (d) research; (e) continued institutional reforms such as land policy; and (f) increased involvement of the private sector in developments.

41. Sudan's medium-term strategy also calls for reviving agricultural development, however with significant shift in emphasis and policies in favour of traditional agriculture. The main elements of the strategy relevant to the LDCF2 project include: (i) land tenure reform (ii) technological package development and outreach (research and extension) (iii) rural credit provision and (iv) improvement of access to markets.

42. The project is also in-line with the Interim Poverty Reduction Strategy Paper (IPRSP, 2011) which emphasizes the promotion of economic growth and employment creation as the first pillar of the Government of Sudan's development strategy. Due to the secession of South Sudan in 2011, the IPRSP stresses diversification in the agricultural sector to relieve losses attributed to a 75% decrease in oil export earnings. Consequently, Sudan's growth strategy will focus on expanding private sector investment and pro-poor and broad based growth in addition to the following areas listed below:

- Targeted support for the agricultural sector (for diversification in particular);
- Adopting policy and institutional frameworks that support growth and poverty reduction;
- Pursuing human development efforts that build a skilled labour force; and
- Development of economic services for agriculture, knowledge related services (research, extension and capacity building).

LDCF conformity

This project is fully consistent with LDCF objectives and priorities:

43. Component 1 of this project supports LDCF/SCCF area objective 3 by promoting the transfer and adoption of adaptation technologies. The technologies to be adopted in this project include hydro-meteorological infrastructure required to support a national EWS and adaptation technologies/packages to be adopted through microfinance loans.

44. Component 2 of this project supports LDCF/SCCF area objective 2 by increasing the adaptive capacity to respond to the impacts of climate change, including variability, at local, regional and national levels by reducing the risks felt by farmers through the introduction of weather based insurance in Component 2. Similarly, Component 3 will facilitate SRFP's access to credit and adaptation technologies.

45. Outcomes 1, 2 and 3 of this project are aligned with the following GEF/LDCF portfolio level outcome/output: Capacity development at the local level to implement climate-related disaster prevention measures.

GEF conformity

46. The project has been designed to meet overall GEF requirements in terms of design and implementation. For example:

Sustainability: The project has been designed to be sustainable at village and at national levels by building the capacity of MF/MI agents on state levels, extending the hydro-meteorological monitoring network and developing a cloud-based data portal to facilitate data sharing and the generation of forecast/agricultural advisory information. The project will also improve vulnerable population's access to financial services and provide training on national, state and local levels.

Monitoring and Evaluation: The project is accompanied by an effective M&E framework, that will enable on-going adaptive management of the project, ensuring that lessons are learnt, management decisions are taken based on relevant and up-to-date information, and regular progress reports are available for concerned parties.

Replicability: Great attention has been paid in the project design to ensure that i) lessons are replicable, ii) sufficient training builds capacity to transfer expertise into other initiatives and that iii) necessary replication mechanisms are in place.

Stakeholder involvement: Following on from the NAPA process, the design of this project was undertaken in a participatory and inclusive manner. Moreover, the design of the project has ensured the appropriate involvement of stakeholders (actors and users) in project development and implementation (See Section 2.9).

Multi-disciplinary approach: the project will undertake a number of activities to ensure various Ministries, local government actors and NGOs/CSOs are fully engaged, have capacities built and can contribute to the development of climate risk transfer services.

Gender equality: the project Outcomes will contribute to an understanding of weather/climate related risks and required adaptation responses. Public awareness campaigns and the integration of women's groups (e.g. Ahfad University for Women, Khartoum, women groups established by and partnered with MFIs, women agricultures associations who have been exposed to Training of Trainer programmes in different areas) will strengthen gender equality in terms of women's ability to use adaptation technologies and financial services to build resilience to climate change. The project has also ensured and will continue to ensure that women are part of interventions and Technical Committees (See Management Arrangements, Section 5) and can voice their suggestions/concerns on the effectiveness of climate risk financial services with the development of end-user feedback mechanisms.

Complementary approach: In order to build upon existing plans and avoid the duplication of efforts, the project will work in conjunction with relevant on-going projects in Sudan and will build off of similar initiatives for each project component (e.g., UNDP Disaster Risk Reduction project and Connecting Farmers to Market project, See Section 2.3).

47. The proposed project has been prepared fully in line with guidance provided by the GEF and the LDCF Trust Fund. The project follows the guidance from the 'Programming Paper for Funding the Implementation of NAPA projects under the LDC Trust Fund (GEF/LDCF 2006). The project focus is also aligned with the scope of expected interventions as articulated in the LDCF programming paper and decision 5/CP.9. As climate impacts fall disproportionately on the poor, the project recognizes the links between adaptation and poverty reduction (GEF/C.28/18, 1(b), 29).

2.2 Country ownership: country drivenness and country eligibility

48. The project is fully in-line with Sudan's Agricultural Revival Programme, which aims to achieve the development of the Agricultural sector by enabling small farmers in all farming subsectors to access micro-credit services to finance the adoption of appropriate technology packages and inputs. Similarly, the project is aligned with the pillars of the Government Poverty Reduction Strategy by developing human resources and promoting economic growth.

49. The project also supports the "Strategy for the Development and Expansion of the Microfinance Sector in Sudan", launched by the Central Bank of Sudan (CBOS) in 2007. This strategy's goal is to facilitate sustained access to financial services for the economically active poor in rural areas. The CBOS also developed a directive for banks to allocate part of their lending portfolios to rural areas to support agriculture/husbandry.

50. In addition, the project is designed to be an integral part of, and support to, the on-going development process in Sudan and supports the decentralized governance system. It will support the integration of climate and environmental information into established policies and programs and will reform financial regulations and frameworks to facilitate access to localized financial services for rain-fed farmers and pastoralists.

51. All components of the project adhere to UNDP's Strategic Plan (SP) for Sudan (2014-2017), which emphasizes building resilience through reforms that reduce financial risk and improve incentives for adaptation and mitigation responses that can work over the medium to long-term. The project is aligned with the SP by focusing on a cross-disciplinary, issues-based approach involving disaster risk reduction, preparedness, response and recovery, and access to climate finance, all to achieve sustainable development pathways. The SP states explicitly that '….Innovation, replication opportunities and lessons learned [must be] explicitly considered in programme development and review." Furthermore, "scaling-up strategies [must] be an essential aspect, to ensure better coverage and impact of development innovations." Effectively, the LDCF2 project has activities supporting knowledge management and has outputs which can be scaled-up (e.g., Weather Index Insurance, adaptation technology and early warning dissemination). The project will test the innovation of Weather Index Insurance (WII) products by scaling-up the initiative in other States. It will also ensure that feedback from citizens on the coverage, quality and cost of financial services is considered during product development. The project is furthermore in-line with the focus areas of the SP by facilitating South-South co-operations and partnerships including regional trainings on forecasting and enabling a study tour of a functioning WII scheme in another developing Islamic country (e.g., Pakistan).

52. The project is similarly aligned with Sudan's Country Program Action Plan (CPAP, 2013-2016) by cutting across Focus Area 1 (Poverty Reduction and Inclusive Growth) and Focus Area 2 (Environment, Energy and Natural Resource Management). A key deliverable related to an expected output of the LDCF2 project is capacity building for microfinance providers. Similarly, two Outputs under Focus Area 2, which are aligned with the LDCF2 project outputs include:

- CPAP Focus Area 2, Output 1: Vulnerable communities to climate change and climatic risks adapted comprehensive sets of adaptation measures; and
- CPAP Focus Area 2, Output 3: Environmental governance policies and regulatory frameworks for enabling better natural resources and risk management developed.

53. The strategy for the adaptation project is also rooted in Sudan's priority needs and challenges identified in Sudan's Five-Year National Development Plan (2012-2016) by focusing on cross-cutting issues of gender, environment and climate change, emergency preparedness and Disaster Risk Management. It also draws on the Comprehensive Peace Agreement (CPA) and Darfur Peace Agreement (DPA).

54. The project is furthermore fully aligned with the UNDAF (2013-2016) outcomes, which incorporate aspects of Sudan's Three-Year Salvation Economic Programme 2011-2013, the Interim Poverty Reduction Strategy Paper (I-PRSP), and the Twenty-Five Years National Strategy 2007-2031. UNDAF addresses efforts to progress the Republic of Sudan from Least Developed Country status.

The LDCF2 project is most closely linked to country priorities of the UNDAF Outcomes 1 and 2 under Pillar 1, Poverty Reduction, Inclusive Growth and Sustainable Livelihoods, with particular attention given to youth, women, groups in need and communities at risk from the impacts of environmental hazards, climate change and recurrent disasters. UNDAF indicators relevant to LDCF2 outcomes include:

- UNDAF Outcome 1 Indicator 2: Number of private sector companies and microfinance institutions providing microfinance services;
- UNDAF Outcome 2 Indicator 2: Number of vulnerable, especially female headed, households adopting climate change adaptation measures; and
- UNDAF Outcome 2 Indicator 4: Number of states with functioning early warning systems, including flood and drought preparedness systems.

55. The project is also in-line with UNDP's Country Programme Document (CPD, 2013-2016), which builds on the UNDAF 2013-2016 and supports the implementation of key development priorities in the government's National Strategic Development Plan of 2012-2016. The CPD aligns itself with the Istanbul Plan of Action for Least Developed Countries in three areas: private sector development, climate change and social protection. The CPD focus areas that will be addressed include Poverty Reduction, Inclusive Growth and Sustainable Livelihoods and Environment, Energy, and Natural Resource Management. A significant emphasis of the proposed project is on enhancing the resilience of rural communities to climate change related impacts on food security, particularly women and children in Sudan, in line with the CPD's cross-cutting issues.

Relevant national frameworks

56. Relevant legislative provisions and existing frameworks relevant to NAPA priorities, the environment and climate change impacts include:

- Environment Protection Act 2001: This act defines general policies and directives for protection of the environment. As such, it specifies that an environmental feasibility study (equivalent to an Environmental Impact Assessment) is required when any project, person or programme shall affect the environment and natural resources negatively. Evaluation of the study is conducted by the Higher Council for Environment and Natural Resources. Chapter III of the Act specifies what contents are required in the study including an analysis of available alternatives. Chapter 5 of the Act lists the environmental degradation acts which are penalized including air/water/soil pollution, desertification of vegetation and changing the natural pathways of water flow.
- Environment and Natural Resource Article 11: (1) The people of Sudan shall have the right to a healthy and diverse environment, (2) The State shall not pursue any policy, or take or permit any action, which may adversely affect the existence of any animal or vegetation species their natural or selected habitat, (3) The State shall promote, through legislation, sustainable utilization of natural resources and best management practices.
- Decentralized System of Governance (Levels of Government, Article 24): Sudan is a decentralized State with the following government levels, (a) national level which shall exercise authority with a view to protection of national sovereignty and territorial integrity of Sudan as well as promoting the welfare of its people, (b) state level which shall render public services, and (c) local level of the government which is concerned with community level activities.
- Right to Own Property Article 43: Every citizen shall have the right to acquire or own property as regulated by law.
- Land Regulation Article 186: Rights in land owned by the Government of Sudan shall be exercised through the appropriate or designated level of Government.
- National Land Commission Article 187: There shall be established a National Land Commission that shall have the following functions, (a) arbitrate over land, (b) entertain

claims, (c) enforce the law applicable to the locality where the land is situated, (f) advise different levels of government on how to coordinate policies on national projects affecting land or land rights, (g) conduct studies and recorded land use practices in areas where natural resource development occurs.

- Hyogo Framework for Action: The Hyogo Framework for Action (HFA) 2005-2015, endorsed by over 150 countries in January 2005, including Sudan, defines five priorities for Disaster Risk Reduction. These include, i) ensure that disaster risk reduction is a national and local priority with a strong institutional basis for implementation, ii) identify, assess and monitor disaster risks and enhance early warning, iii) use knowledge, innovation and education to build a culture of safety and resilience at all levels, iv) reduce the underlying risk factors and, v) strengthen disaster preparedness for effective response at all levels.

57. Relevant legislative provisions relevant to insurance and microfinance services include:

- The Organizational and Regulatory Framework for Microfinance Institutions (2008) The Central Bank of Sudan, the regulating agency for banking, developed this framework in order to facilitate the emergence of specialized microfinance institutions. The framework specifies the types of acceptable microfinance institutions, required registration regulations and conditions and the establishment of procedures and controls. It furthermore details prohibited activities to be undertaken by MFIs, debts ratings, provisions for loan loss reserve policies and write-off policies.
- Insurance Supervisory Act (2001) - In 2001, the Insurance Business Act (1992) was amended and incorporated into the Insurance Supervisory Act by the Insurance Supervision Authority (the Authority). The Authority, part of the Ministry of Finance and Economic Planning, is responsible for the supervision of insurance businesses, advises on policy development, and has a role to increase national income. The Authority has the power to supervise and control insurance companies, advise on the number of insurance companies, license insurance companies, and develop classes of insurance. The Insurance Supervisory Act 2001 governs insurance in Sudan in accordance to the provisions of Article 90 (1) of the Constitution of the Republic of Sudan (1998) in accordance with the components listed below which are most relevant to the development of micro-insurance.

  - Insurance business in Sudan is divided, into Takaful and General Insurance. Whilst there is no specific mention of micro-insurance as part of the Insurance Supervisory Act, micro-insurance comes under the 'miscellaneous insurance operations' section of the Act which must be approved by the Supreme Authority for Sharia.
  - All insurance companies must establish reinsurance support with the National Reinsurance Company in accordance with the percentage determined by the Board of the Insurance Supervision Authority.
  - The policy holder has the right to bring lawsuits relating to the insurance policy in any court of competent jurisdiction.
  - No person shall act as an agent or insurance producer to more than one company at the same time, only after obtaining the written approval from the concerned companies.
  - Each actuarial expert must obtain a license from the Authority, which is required to obtain approval of the Authority before contracting, in the case of foreign actuary activities.

58. However, it should be noted that there is a lack of policies which support pastoralism.[16] The Civil Transaction Act (CTA) (Section 565) identifies pasture land 'by subtraction' from other uses (namely agriculture and forests). Furthermore, the CTA empowers State authorities to impose restrictions on grazing as to time and place, and also allocate land for grazing for the benefit of the whole community and the protection of animals resources (ibid). Therefore, overall in Sudan, there is

[16] Feinstein International Center, Tufts University and UNEP Study, *Standing Wealth: Pastoralism Livestock Production and Local Livelihoods in Sudan*, 2013

little or no consideration of pastoralism as a well-defined, legitimate livelihood system. According to the Feinstein study (2013), the lack of a specific policy on pastoralism is partly a result of a lack of understanding on the importance of strategic livestock mobility, which has exacerbated the explicit bias in favour of sedentary farmers. The study recommended that Sudan could take inspiration from the African Union Policy Framework on Pastoralism, the pastoral code in the Islamic Republic of Mauritania and the innovative policy on development of arid and semi-arid land recently adopted in Kenya.

2.3 Design principles and strategic considerations

2.3.1 On-going relevant national and regional related initiatives

59. The proposed second LDCF project (LDCF2) will build strategically on the LDCF1 (first NAPA follow-up) project that is currently under implementation in phase II (with additional funding from the Government of Canada). The LDCF2 project will focus activities in the same regions of high rainfall variability, thereby providing complementary risk management mechanisms to support the on-going adaptation technology implementations in LDCF1.

60. The on-going LDCF1 project aims to introduce a set of adaptation measures targeted towards small-scale rain-fed farmers and pastoralists residing in 4 highly vulnerable agro-ecological regions (River Nile State, Northern Kordofan, Gedarif and Southern Darfur), as identified by the NAPA. The LDCF1 project is in the process of implementing measures of share-cropping, water harvesting, sand stabilization and tillage adjustments, rangeland and farm crop diversification, strengthening local leadership for adaptation, communal funds for shock absorption and community-based early warning. The choice of States for LDCF1 was justified by the Sudan Poverty Reduction Paper, which used a combined index to measure deprivation. The States of the Red Sea, Blue Nile, Kassala, and North and South Kordofan emerged as the most deprived areas for both rural and urban populations. Consequently, these regions were prioritized for poverty reduction efforts. For the LDCF2 project, by putting an additional overlay of climate risk, measured by a high coefficient of variability for rainfall, which can be directly correlated with rural incomes, Kassala, White Nile, North Kordofan and Gedarif States emerged as additional vulnerable regions and have consequently been prioritized as target locations for the proposed project. Therefore, the LDCF2 initiative will focus on implementing climate risk finance measures in the original 4 agro-ecological zones (Annex 9a) and will extend geographically to cover the States of Kassala and White Nile that equally meet the above criteria of climate variability, reliability on climate sensitive livelihood and high incidents of climate poverty.

61. To maximize use of financial resources in addressing residual climate risk, the LDCF2 project will work with existing beneficiaries in 4 of the 6 target states, who have already adopted adaptation technologies. As these populations are already knowledgeable and experienced on adaptation technologies, they will serve to be key target groups to test financial and insurance services. These target populations also now possess a deeper understanding of climate change and the value of participatory approaches, which will enable them to more effectively judge how the provision of financial services can help to build their resilience to climate change.

62. According to the mid-term evaluation of the LDCF1 project, it was recommended that all adaptation projects in the natural resources sector should be integrated into a single strategic, long-term approach. The LDCF2 project will be closely aligned with many of the LDCF1 objectives, and address some of the main recommendations from the mid-term evaluation of the LDCF1 project, namely to focus on organizational, economic and financial practices of the communities in the face of climate change, addressing issues such as credit, market access and insurance.

63. As such, the LDCF2 project can be seen as highly complementary to the LDCF1 by strategically filling in the gaps identified in the LDCF1 project. The gaps to be filled include:

- Bringing additional expertise on the social, economic and business aspects of agricultural production/water management/climate change to the sites;

- Bringing additional resources for knowledge management, lesson learning, and participatory planning brought to the States and the sites; and
- Engaging with existing Stakeholders on how to improve their resilience to CC by facilitating access to financial services and conducting strategic, localized assessments with villages and state level stakeholders prior to developing the WII and microfinance products.

64. The LDCF2 project will also learn from and build on the successful aspects of the LDCF1 project by using the similar Technical Committee (TC) structure at state levels. In the case of the LDCF2 project where multi-disciplinary expertise is required, a state-based MFI focal point, state insurance agent, adaptation technology expert and gender-focused NGO/CSO will be included in the committees. The current State NAPA or NAP coordinators will provide a support role to the TCs to ensure no duplication of activities with other adaptation-related initiatives.

65. In addition to the LDCF1 project, other regional related projects focusing on early warning, adaptation and/or microfinance include the following:

- The ***FISU*** project (worth €380,000, to be completed in 2014) provided by the Finish Government aims is promoting adaptation to climate change by reducing weather and climate-related losses through improved agro-meteorology services in Sudan. FISU addresses issues of sustainable development and peace-building by promoting North-South cooperation at the Sudan Meteorological Authority (SMA).
- The Famine Early Warning Systems Network (***FEWS NET*** funded by USAID) data portal provides access to geo-spatial data, satellite image products, and derived data products in support of FEWS NET monitoring needs throughout the world. Sudan exploits FEWS NET products, such as IPC Version 2 by FEWS NET and is contributing to the Integrated Food Security Phase Classification (***IPC***) project (EU). The Humanitarian Aid Commission (HAC) is working with FEWS NET to provide baseline information for livelihood zones, under a side project funded by USAID (150,000 USD, 2013-2014).
- The ***Eastern Nile Technical Regional Office (ENTRO***), a technical regional body supporting the implementation of ***Eastern Nile Subsidiary Action Program (ENSAP***) has a programme entitled, Design of an Upgraded Data Acquisition, Communication and Flood Forecasting Systems. ENTRO intends to provide Regional Flood Coordination in Addis Ababa to support flood forecasting and mitigation efforts in Ethiopia, Egypt, and Sudan and to facilitate data exchange between the three countries, all Eastern Nile States. Also, the ***Flood Preparedness and Early Warning Project, FPEW II*** is the second phase of one of ENTRO's fast track projects planned to support hydrologic forecasting and flood early warning in the Eastern Nile countries. The objective of the FPEW II project is to support operational flood forecasting through inter-country data exchange, improved emergency response by governments at all levels and community preparedness.
- The ***IGAD-HYCOS*** project aims to establish a regional water management information system and to strengthen observation networks and their real-time data transmission within participating countries including Kenya, Uganda, Sudan, Ethiopia, Somalia, Eritrea and Djibouti and more recently South Sudan, Burundi and Rwanda. IGAD-HYCOS also includes promoting enhanced regional cooperation for the collection, analysis, dissemination and exchange of hydrological and hydro-meteorological data and information for water related decision making.
- The United Nations Office for Outer Space Affairs (**UNOOSA**) is presently supporting RSA to use space technology data for natural resources management, environmental monitoring and disaster management. Similarly, the **UN-SPIDER** program is providing support to RSA with training workshops in Disaster Risk

Management which detail available data sources and open source software and free models that support climate forecast and early warning.

- RSA is currently being supported by the **Global Monitoring for Food Security** (GMFS) project funded by the European Space Agency to optimize agricultural surveys with satellite earth observations.
- The ***North Kardofan Services Project,*** which is focusing on building capacities to perform rainwater harvesting.
- The ***Great Green Wall Initiative-GGW***[17] (100 million USD, with donors including WB, UNEP, WFP, UNCCD and GEF, signed 2010, to begin in 2013) is an on-going initiative aiming to "green" the African continent across the 4,400 mile east-west axis of the continent as a defense against rapid, expanding desertification of the Sahara. The project includes 11 countries, one of which being Sudan having the largest GGW stretch of 1,500 kilometers long and 25 kilometers wide. The aim is to tackle poverty and the degradation of soils and it is expected that in 2013, Sudan will begin partaking in the GGW to support Sudan's important Arabic gum belt. The GGW initiative will address policy, investment, and institutional barriers that exacerbate the effects of climate change and variability, leading to desertification and deterioration of the environment and natural resources and the risk of conflicts between communities. International Colloquiums are currently held to discuss barriers as well as share available knowledge on vegetal species.
- ***Peace Consolidation Project*** (World Bank and SMDC), which is providing Microfinance services to South Darfur.

66. Overall, the proposed LDCF2 project will coordinate and share information with these other LDCF-financed interventions aiming to strengthen hydro-meteorological services and early-warning systems by providing funds to support the technical institutions (Sudan Meteorological Authority, Remote Sensing Authority, etc) to attend regional trainings in Ethiopia and/or elsewhere in Africa and abroad. As data will be centralized in a cloud database (see Figure 1), it will be possible to share information with other National Meteorological Agencies and with regionally based forecasting centres to improve the quality of forecasts and facilitate downscaling.

2.3.2 Baseline projects and financing

67. This project will build off on-going early warning, adaptation and MF/MI based projects, which are planned or have demonstrated success on the ground. These projects are considered to be baseline for the LDCF2 project. Note that some will provide co-financing and all will be considered partners.

68. ***The National Disaster Risk Management Programme in Sudan*** (2.27 million USD, 2013-2016) will begin implementation in late 2013 in Kassala State for flood risk management as well as work in two (2) other states for drought risk reduction. These states may include: North Darfur, North Kordofan, Northern State or Red Sea State depending upon the stability and security situation. The programme is a joint project funded by UNDP, BCPR, UNEP and ISDR. Relative to the LDCF2 project, the programme has a relevant output regarding strengthening EWS in a gender-sensitive manner through hazard monitoring, data analysis and warning dissemination. The project plans on improving the EWS by, i) forming a multi-sectorial National Early Warning Committee to provide EWS policy advise and technical guidance, ii) providing training for SMA, MoWRE and RSA on new technologies and data interpretation, iii) preparing SOPs on the dissemination of EWSs, iv) training SMA volunteers (e.g., from amongst teachers, imam mosques, farmer's unions) on weather data

[17] http://sudanow.info/new/interview/the-african-great-green-wall-interview-with-environment-minister-hassan-a-hilal/

reporting, v) procuring and installing 2,000 rain gauges in states at high risk of flood and drought disasters, vi) providing warning dissemination equipment to HAC and Civil Defence offices and, vii) providing a computer cluster to SMA for weather analysis, forecasting and climate predictions. Another output of the project plans to implement flood and drought risk reduction strategies at state and community levels including, i) community training, drills, awareness-raising on drought and flood mitigation schemes, ii) forming a multi-sectorial DRR committee to lead state and community strategies for drought and flood mitigation, and iii) identifying high risk locations which require flood and drought mitigation.

69. ***The Food Security Policy and Strategy Capacity Building Programme*** (FSPS, 8.6 million Euro, 2013-2016, EU-FAO) is also developing early warnings in Sudan but from a food security perspective. This project is designed to support the selected State Governments of Blue Nile, South Kordofan, Kassala and Red Sea in addressing the capacity gaps related to i) Food security inter-sectorial institutional coordination framework, food security policy and information system; and ii) Line ministries' policy planning, budgeting, monitoring and implementation capacity.

70. In terms of Micro-finance initiatives, IFAD has been assisting the Agricultural Bank of Sudan Microfinance Initiative (***ABSUMI***, USD 2 million) to provide nano-finance loans and savings to rural women cooperatives since 2010. Due to the great success of the project (100% repayment and 98% outreach achieved), the Government of Sudan has requested IFAD to provide support to upgrade ABSUMI to a full-fledged rural development initiative under the name of the ***Rural Women Economic Empowerment and Development Programme***. The programme's main focus will be to support rural women through organizational support and financial services. To enhance the impact of the financial services on the targeted households' incomes and food security, the programme will provide technical support and training to women in crop production, livestock production, vocational training, household economy and nutrition, and business development management skills. The programme objective is to establish 32 separate microfinance units under the governances in 7 states to reach around 800,000 clients with rural financial services in 8 years. The geographic areas to be covered by the new programme will be North and South Kordofan States, Sennar, White Nile, River Nile State, Kassala, Gadarif, Red Sed and Gezira States (common States with the LDCF2 project being North Kordofan, White Nile, River Nile, Kassala and Gedarif).

71. Another baseline initiative involving micro-insurance and microfinance development is the ***Connecting Farmers to Market*** project (CBS, Khartoum bank, 36.5 million USD).[18] This project has enabled farmers to be more productive by using MF lending services linked with micro-insurance to support crop production and livestock. The project has not yet focused on solely pastoralists but rather agro-pastoralists. The services provided to farmers include MF/MI, savings, agricultural extension services and access to markets. The WFP is currently providing Food for Training. The project covers the states of White Nile, Blue Nile, North Darfur, West Darfur, South Darfur, North Kordofan, South Kordofan, Red Sea, Gedarif and Kassala states (common states with the LDCF2 project being Gedarif, Kassala, North Kordofan and White Nile). Currently, the Farmers to Market project is in its 4th season. At present, approximately 42,000 farmers and 13,500 agro-pastoralists have received microfinance and micro-insurance services. Training has been provided to the farmers on micro-insurance and savings (Note: MFIs have different payment schedules and target different crops in each state). Al-Tawania is managing the insurance, the Sudanese Microfinance Development Corporation (SMDC) is managing the funds, CBOS has acted as the fund distributor and regulatory body while WFP and the Agricultural Bank of Sudan have acted as the main buyers. (The Bank of Khartoum was an important shareholder during previous seasons.)

72. Relative to adaptation technologies, a baseline project is the ***Seed Development Project*** (2011 – 2017, USD 17.5 million supported by IFAD). This project is testing the model of a private public partnership (PPP) between private seed companies, the farmers and the public extension services to produce and market certified seeds for smallholder, traditional rain-fed farmers who generally grow less than fifteen feddans (6.3 ha) of land. The project area is composed of 4 localities: Rahad and Sheikan in North Kordofan and Abbassiya and Abu Gubeiha in South Kordofan. A minimum of

[18] http://www.cgap.org/blog/innovations-islamic-microfinance-small-farmers-sudan

approximately 108,000 traditional rain-fed smallholder farmers, of which at least 30,000 women, are expected to benefit from the Seed Project through increased returns from the use of quality certified seed. Furthermore, around 1,280 seed growers in approximately 32 groups are expected to benefit from the Seed project.

73. The ***Agricultural Research Corporation***, as the semi-autonomous official technical arm of the Sudan Ministry of Agriculture, is supporting the Seed Development Project as well as numerous other demonstration pilots for adaptation technologies. ARC is the authorized body for crop variety release and seed certification. They have significant expertise in developing and distributing adaptation technologies for land preparation, irrigation, rangeland and pasture improvement, plant nutrition, pest control, and agricultural engineering. In the context of the Seed Development Project, ARC is using its El Obeid-based research station in North Kardofan to conduct seed propagation and testing so that quality seed inputs are distributed and adopted by small holder traditional farmers. The primary role of the Agricultural Research Corporation (ARC) of Sudan is to assist the Extension Services with the adoption of sustainable, adaptation technologies through on-the-farm training.

74. The ***Shiekan Insurance and Reinsurance Co***., Ltd. has implemented insurance products for small holder rain-fed farmers and pastoralists since 2002. In view of catastrophic risks and the need for government support, Shiekan developed crop insurance for traditional farmers in 2002. They also have extensive understanding and capacity to provide livestock insurance. In fact, in 2011 Shiekan was able to provide crop and/or livestock insurance to 40,000 SRFP in Blue Nile, White Nile, North Kordofan, North Darfur, South Darfur and West Darfur states. Insurance products are currently marketed and distributed using Shiekan's network of 70 branches and offices throughout Sudan.

75. The baseline projects which will co-finance the LDCF2 project are detailed below and summarized in Table 1.

Table 1: Co-financing from Baseline Projects

Sources of Co-financing	**Purpose**	**Amount (USD)**
Agricultural Research Corporation (ARC)	To build on ARC's expertise in improving production technologies and in facilitating the distribution and adoption of approved technologies dealing with crop and livestock production. ARC has developed adaptation technologies for land preparation, irrigation, water harvesting, rangeland and pasture improvement, plant and animal nutrition, pest and disease control, and agricultural engineering. Acting as the technical operational arm of the Ministry of Agriculture, ARC has significant experience in assisting Extension Services such as through the Seed Development Project where it is responsible for seed propagation and testing. In return, the LDCF2 project will support ARC and Extension Departments in each of the 6 states to establish demonstration farms to exhibit the best practices of adaptation technologies for both crop and livestock production.	2 m
Agricultural Bank of Sudan (including the ABSUMI initiative)	To build off their high outreach and extensive experience in dealing with agro-pastoralists and in providing rural women microfinance and savings through the ABSUMI initiative (Rural Women Economic Empowerment and Development Project)	7 m

Shiekan Insurance and Reinsurance Co., Ltd.	To build off of Shiekan's experience in providing insurance products including micro-insurance products to small holder rain-fed farmers and pastoralists. Shiekan also has extensive understanding and capacity to carry risk. The LDCF2 project will build the capacity of Shiekan's personnel to understand and manage new Weather Index based Insurance products by training insurance agents in each stat. The products will be marketed and distributed using Shiekan's network of 70 branches and offices throughout Sudan.	3.2 m
Higher Council for the Environment and Natural Resources	To build off their experience in implementing the first NAPA (LDCF1) project in 4 of the 6 target States and beginning the NAP process in the remaining States. HCENR will provide an in-kind contribution consisting of an office for the Project Management Unit, supervision, access to an environmental library and support for consultations and logistics.	1 m
State Governments (all 6 States, each $500,000)	To build off their experience in implementing the first NAPA (LDCF1) project in Gedarif, North Kordofan, River Nile and South Darfur and beginning the NAP process in the Kassala and White Nile States. Each State will provide an in-kind contribution of office space, staff contribution and logistical support.	3 m
SMA Existing Equipment	To build off the current capacity of SMA to generate weather forecasts and climate predictions. SMA will provide an in-kind contribution consisting of staff, office space, weather and climate monitoring equipment and logistical support.	2 m
UNDP	The UNDP Sudan country office has been supporting climate change, community development and microfinance projects since 2009. Experiences and outreach capacity from these UNDP initiatives will directly support the development of microfinance and Weather Index-based Insurance as planned under the GEF LDCF project.	0.6 m
Total Co-financing		**18.8 m**

2.3.3 National and local benefits

76. This project supports national development goals and plans to achieve Millennium Development Goals (MDGs) 1, 3 and 7.

- MDG 1: Eradicate extreme poverty and hunger – by providing access to financial services and improved forecasts and early warnings for SRFP currently in poverty in order to build their resilience to climate shocks. Seasonal forecasts and adaptation technologies can enable the rural population to take adaptive farming measures to ensure productivity.
- MDG 3: Promote gender equality and empower women – Women will be empowered by enabling them to have access to financial services and to take decisions based on forecasts and agricultural advisories (NGO/CSOs associated with Ahfad University).
- MDG 7: Ensure environmental sustainability – The foundation of this project is to ensure environmental sustainability by integrating EWS/CI into planning and decision-making as well as to

build resilience of SRFP to climate change by enabling them to have access to adaptation technologies.

77. Specifically, this project will be used to extend the national hydro-meteorological service networks and to build capacity for institutions throughout Sudan on national, regional and local levels. On the national level, the project will be used to build the operational and technical capacities of the Sudan Meteorological Authority (30 women / 50 men), the Remote Sensing Authority (20 women / 20 men), the Ministry of Water Resources and Electricity (20 women / 20 men), the Ministry of Agriculture, including state outlets (20 women / 50 men), and the Humanitarian Aid Commission (10 women / 10 men). This accounts for 250 people.

78. The project will support the Agricultural Research Corporation (ARC) to spread and test adaptation technologies including on-the-farm training and will support dry-land adaptation for pastoralists. On the national level, 163 researchers will receive training, including 14 women. On the state levels, the following number of researchers will be trained: Kasala; 5, Gedarif 6, River Nile: 20, White Nile: 3, North Kordofan: 15 and South Darfur: 4.

79. Data sharing will also extend weather/climate information to all institutions managing hydro-meteorological equipment and MFIs/Insurance companies including the creation of a data link between RSA and the existing EWS in Sudan and linking two-way data transfer between MFI / insurance companies and SMA/RSA/ARC/MoWRE. In total, this accounts for 3,000 beneficiaries.

80. MF/WII products will be offered to approximately 45,000 SRFP. According to the MicroEnsure pre-feasibility study, this number includes 1% of total subsistence farmers, 10% mixed crop (half cash crop / half subsistence farmers) and 2% contract-like farmers (i.e., those that are supported by a delivery agent who provides seed and farming guidance in return for cultivated crops) in the 6 target states.

81. In rural Sudan, women as household members or heads of households contribute appreciably to the household economy and food security in diversified ways with differences among regions. Beside their routine household duties, women participate in household farming by contributing to crops cultivation in back yard farms (Jubrakas), which provide households with early income and food prior to the harvest of field crops; feeding and watering of the household herd when at home, collection of water and fire food, and milling of grains. In many rural areas women also undertake non-farm enterprises like traditional food processing, petty trading, poultry rearing, and traditional apiculture etc, where most of their earnings are dedicated to family well-being. Overall, the project plans to target at least 50% women. As women are known to be more financially responsible, it is expected that women groups will be targeted to pilot the financial services to be developed in the LDCF2 project.

82. On regional and local levels, the capacity of pastoral focal points will be built with the assistance of NGOs/CBOs (Al-Masar). This accounts for approximately 300 grass-root beneficiaries. In terms of pastoralists, it has been estimated that there are at least 2.7 million nomadic herders making their livelihoods off pastoral production systems in Sudan. This figure is likely to be much bigger (perhaps 4 times bigger), because there are many additional households using subsistence services and other economic services from pastoral livestock. In the target States, a conservative estimation is that the LDCF2 project will aim to target 10,000 pastoralists with awareness raising on appropriate, climate-resilient dry-land technologies.

83. Overall, the project will improve adaptation to extreme weather events for some of the most vulnerable communities in Sudan. It is expected to provide alerts, weather/climate/agricultural advisory to the target regions with potential for up-scaling. Through building the capacity of sub-national institutions to understand and efficiently disseminate alerts, microfinance and insurance services, the project has the potential to benefit 1.3 million farmers and 300,000 pastoralists in all 6 states.

84. The private sector will also be potential beneficiaries for the project. The insurance companies (e.g., Shiekan) and some banks (Bank of Khartoum), which are active in providing MF/MI services to farmers and pastoralists at present will continue to be supported. The LDCF2 project has

the potential to provide benefits at least several hundred private clients, particularly those on regional and local levels when MFIs and insurance agents in regional branches are trained.

85. Finally, activities for this project will build EWS, adaptation, and financial services capacity to inform community-driven adaptation plans. Through this project, these plans will be integrated into Sudan's Fiver Year Strategic Plan (2017-2021). Furthermore, legal and regulatory frameworks will be updated to facilitate the access of financial services for SRFP which will have long-term positive benefits for the rural populations throughout the country who are vulnerable to extreme weather events and climate change.

2.3.4 UNDP comparative advantage

86. UNDP's comparative advantage stems from its strong presence in the area of climate risk management in Sudan. It supported the NAPA formulation and helped Sudan to access the LDCF funds for critical NAPA priorities. UNDP is also among the lead agencies supporting the Central Bank of Sudan in developing a micro-finance facility and helping to build essential capacities to make MFIs more demand oriented to be able to meet the needs of the poor. The project will benefit from UNDP's analysis of some of the important lessons and experiences from developing climate risk mechanisms in Ethiopia, Kenya, Malawi, Mexico, India, the Caribbean and other developing countries. UNDP also has significant experience globally as one of the lead GEF Implementing Agencies in the area of climate change adaption.

87. The proposed project is aligned with UNDP's comparative advantage, as articulated in the GEF matrix, in the area of capacity building, providing technical and policy support as well as expertise in project design and implementation. Additionally UNDP has close links with the Government, as well as a high level of experience managing other LDCF projects in the region, in particular those with an adaptation component.

88. UNDP is already conducting several programs and initiatives that directly relate to capacity building within the context of DRM and adaptation (See Section 2.3). The UNDP-Sudan Country Office is therefore already connected to important government agencies that will be instrumental in implementing the LDCF2 project.

89. The UNDP country office is also supported by Regional Technical Advisors at UNDP offices in Bratislava and Addis Ababa, as well as by policy, adaptation, economics and climate modelling experts in New York, Cape Town and Bangkok. A network of global Senior Technical Advisors provide additional technical oversight and leadership helping to ensure that programs on the ground achieve maximum policy impact. There are other LDCF, SCCF and Adaptation Fund -financed projects within the region with similar objectives currently supported by UNDP, which means that there is substantial in-house technical expertise that can support the Government with project implementation. Also in Sudan, UNDP is uniquely positioned to exercise Results Based Management and leverage its extensive knowledge of the similarities and differences between countries at different stages of development, and to translate that into evidence-based insights for effective, adaptable development solutions.

90. In Sudan, UNDP has a very large programme of projects focusing on governance, decentralisation, peace-building, gender environment and energy. The UNDP Country Programme counts on partnerships within and outside the UN System including with the government and donors to help build national capacity. Most significantly for this project, UNDP has a physical presence in each State, which will provide significant guidance and technical support during implementation of the LDCF2 project.

2.4 Project Objective, Outcomes and Outputs/activities

Project Objective[19]

The project objective is to increase climate resilience of rain-fed farmer and pastoral communities in regions of high rainfall variability through climate risk financing

91. The project aims to strengthen the institutional capacities of financial services on national and state levels to offer relevant microfinance and Weather Index Insurance products to smallholder rain-fed farmers and pastoralists. A set of complementary outcomes and outputs will be used to strengthen monitoring and forecasting capabilities as well as to build capacity within technical agencies to mainstream weather/climate monitoring into the national, state and sectorial planning in the broader context of supporting financial services and climate change risk reduction.

92. By facilitating the development and adoption of climate risk transfer products along with enabling smallholder rain-fed farmers and pastoralists (SRFPs) to have more resilient and productive livelihoods, the LDCF2 project will support the Theory of Change[20]. Project activities will enable SRFPs to have access to capital to purchase adaptation technologies and will provide them with weather and climate information and warnings so that they can be empowered to take preventive and adaptive actions. Furthermore, by implicating the private insurance sector who is inherently incentivized to support extensive and reliable climate and weather monitoring to ensure low basis risk, targeted early warnings and seasonal forecasts will be improved in the long-term.

93. National and decentralized authorities (regional government focal points, communities, women-focused organizations, NGOs/CSOs, media, farmers' associations) and the private sector have been important stakeholders in defining these outcomes and outputs supporting change during project development. These Stakeholders will continue to be consulted during project implementation and will be provided with the space and opportunity to contribute to the design of project activities.

Component 1: Institutional framework and capacity for sustainable climate observation and early warning

Outcome 1: Institutional and technical capacity for climate observation, forecasting and early warning strengthened at national and local levels

2.4.1 Baseline Component 1 - Without LDCF Intervention

94. Regional early warning systems have been implemented in Sudan to produce alerts for food insecurity (by HAC and the Ministry of Agriculture) to notify residents when water is insufficient for irrigation or to notify humanitarian organizations when food aid is required. Such food security EWSs use agro-climatic data and are based on a partnership between the National Hydro-Meteorological Service (NHMS) and the Ministry of Agriculture. The NHMS also provide warnings regarding droughts and floods on national and regional levels such as to predict trans-boundary floods in the Horn of Africa.

95. Communication dissemination for early warning systems is currently housed at the Humanitarian Aid Commission (at the Ministry of Humanitarian Affairs), which provides overall coordination of post disaster aid distribution among the government and aid agencies. HAC's role is also to notify local populations (through NGO assistance) about epidemics, fires and emergencies and armed conflicts. The Office for the Coordination of Humanitarian Affairs (OCHA) is also engaged in

[19] *Objective (Atlas output) monitored quarterly ERBM and annually in APR/PIR*

[20] *Review of the use of 'Theory of Change' in International Development* Review Report, Isabel Vogel, April 2012

emergency preparedness and response, involving government, international agencies and NGOs in developing contingency plans.

96. In spite of several EWSs being in place and various actors taking part in the process, none of the current systems have the robustness and the coordination needed for addressing looming food security threats and floods on a real-time basis; forecasts in themselves are not localized and have not been able to be accurate in detecting seasonal drought. Moreover, the EWSs do not operate effectively at the state and sub-national levels to serve the interests of local rain-fed farmers and pastoralists. Previously, SRFP in Sudan used indigenous forecasting methods to predict seasonal climate events. However, such traditional forecasting methods are not proving to be reliable with increasing climate variability.

97. Overall, the resources, including institutional functions, are scattered across many organizations; over 10 ministries and institutes are charged with varied responsibilities for disaster risk planning and management at federal and state levels for hazard monitoring, preparedness and ex-post aid coordination. Insufficient budgets have resulted in 162 silent rain gauges in the target states and an inability to renew model and satellite data licenses.

98. Independent reports have also verified the existing weaknesses of the early warning systems in Sudan. A study by Heynert (2006) detailed that several agencies produce their own ad-hoc flood forecasts, with often inconsistent results. A subsequent study by Michael Cawood & Associates continued on this observation and noted that after a flood forecast announcement, the tendency was to wait for assurance of this forecast by means of rising river levels before taking action. This reduced the effective forecasting lead time by several days, preventing time for mobilization to implement risk-reducing measures (e.g., sand-bagging).

99. The following discussion details the capacities and needs of each NHMS separately. It also shows which projects have built or are building capacities within these institutions.

Ministry of Water Resources and Electricity

100. In terms of NHMS technical capacity, the Sudanese National Hydrological Service, the Ministry of Water Resources and Electricity (MoWRE) can provide several days of forecasting lead time for densely populated areas along the White and Blue Nile Rivers using the MIKEBASIN flood forecasting model. Additional lead time for forecasting on the Blue Nile can be provided using regional forecast and observed precipitation in the Ethiopian highlands.

101. MoWRE is responsible for operating and maintaining a surface hydrological monitoring network of 25 water level meters, 8 manual flow meters and 3 Acoustic Doppler Current Profiler (ADCP) flow meters. The equipment is used to validate flood forecasts. Paid observers take manual readings once a day at minimum. Data is sent daily, weekly and monthly via wireless telephone (GRPS) and transmitted to the MoWRE centre in Khartoum. An exception is reservoir level management for hydropower operations. MoWRE is currently capable of generating automatic alerts to the populations located around the dams through radio communication.

Table 2.Status of existing hydrological equipment under MoWRE

Station type	Existing	Fully operational
Water level (stage) measuring equipment	25	12
Manual flow meters	8	4
Acoustic Doppler Current Profiler (ADCP) flow meters	3	2
Hydrological stations	0	0

102. Baseline projects related to water resources are associated with the ***Eastern Nile Technical Regional Office (ENTRO***), a technical regional body supporting the implementation of ***Eastern Nile Subsidiary Action Program (ENSAP***). This program is funded by Riverside and UNESCO.

103. The overall programme is entitled, Design of an Upgraded Data Acquisition, Communication and Flood Forecasting System. ENTRO intends to provide Regional Flood Coordination in Addis Ababa to support flood forecasting and mitigation efforts in Ethiopia, Egypt, and Sudan and to facilitate data exchange between the three countries, all Eastern Nile States. Significant opportunity exists to improve the quality of forecasts in each of the Eastern Nile countries through acquisition and interchange of real-time hydrologic and meteorological data. These data can be transmitted to ENTRO/RFCU to be shared by the three national forecasting centres. The plan for this program includes 6 main actions including i) reviewing the river flood prone areas in Ethiopia and Sudan and flow forecasting needs at High Aswan Dam in Egypt, ii) designing the upgrade of the necessary hydro-meteorological data monitoring networks in Egypt, Ethiopia and Sudan required to support real time flood forecasting for these locations, iii) identifying other data sources such as weather data and satellite imagery from global sources to be used by the NFCs in Egypt, Ethiopia, and Sudan, and iv) designing the upgrade of the link between the national flood forecasting centres and ENTRO for data sharing.

104. The ENTRO project is located entirely along the main country rivers, including small portions of their flood plains (Annex 9b). The project site then does not include the rain-fed areas under the LDCF2 project. Also, the ENTRO project is focused on the design of the upgrade of the hydro-meteorological system rather than the actual implementation.

105. The ***Flood Preparedness and Early Warning Project, FPEW II*** is the second phase of one of ENTRO's fast track projects planned to support hydrologic forecasting and flood early warning in the Eastern Nile countries. The objective of the FPEW II project is to reduce human suffering caused by frequent flooding while preserving the environmental benefits of floods by improving flood plain management in urban centres and rural communities, supporting operational flood forecasting through inter-country data exchange, improved emergency response by governments at all levels and community preparedness.

106. The ***IGAD-HYCOS*** project aims to establish a regional water management information system and to strengthen observation networks and their real-time data transmission within participating countries including Kenya, Uganda, Sudan, Ethiopia, Somalia, Eritrea and Djibouti and more recently South Sudan, Burundi and Rwanda. The overall objectives of the IGAD-HYCOS project are to promote sustainable and integrated water resources development and management in the IGAD region and enhance regional cooperation for the collection, analysis, dissemination and exchange of hydrological and hydro-meteorological data and information for water related decision making.

107. In spite of the technical capacity of MoWRE and project support to perform flood modelling along the Nile Rivers, a systematic arrangement for flood forecasting, warning and communication is not operational in Sudan and localized flood forecasts for vulnerable rain-fed farmers and pastoralists outside of the river flood plains are limited or non-existent. Most hydrological equipment is manual which prevents rapid warnings for inundation and flash floods from being generated and disseminated. Some flow gauges have been damaged during floods and others have been poorly maintained. At present, approximately 40% of the equipment is not functioning. Furthermore, although MoWRE has been trained by external experts during recent years over weekly increments, this limited training has not enabled them to make national coverage of flood or water management models fully operational. Finally, the annual operation and maintenance budget for MoWRE's hydrological network is limiting at USD 223,000.

<u>Remote Sensing Authority</u>

108. The Remote Sensing Authority (RSA) is responsible for establishing and maintaining natural resources geo-databases based on remote sensing data analysis and aided by field observation. RSA is also in charge of land cover mapping / land use change detection, focusing mainly on trend, impact and consequences of the changes. RSA uses digital geo- referenced Sudan land cover databases (e.g., LCCS, MadCAT and GeoVIS), including space technology (UNOOPS and UNSPIDER) for early warning of potential agricultural problems, disaster prevention and management, forest / rangelands / wildlife monitoring, production statistics and climate change assessment.

109. Most relevant to the LDCF2 project, RSA has the capability of estimating agricultural crop area measurement and crop yield estimations incorporating low resolution satellite data such as MODIS data for crop monitoring. With land cover and socio-economic information, they can also demarcate rangeland extent and livestock routes. Furthermore, they are capable of monitoring rainfall and the spatial extent of flash floods to assess the impact of floods on the agricultural crops using different indices product from MODIS satellite data. Similarly with NDVI and other similar indices, they can develop drought information using images of evapotranspiration and soil moisture. Currently, RSA is annually allocated USD 100,000 through Government budget lines.

110. RSA is currently being supported on-demand by the United Nations Office for Outer Space Affairs (UNOOSA). UNOOSA supports RSA to attend workshops and conferences and to participate efficiently in regional satellite/space data-related initiatives. Presently, Sudan uses space technology data for natural resources management, environmental monitoring and disaster management. Furthermore, Sudan hosted a UN – SPIDER Technical Support (TAS) workshop during 22 – 26 May 2011. The workshop was planned to be a first step towards "Institutional arrangements and coordination for RSA and six major institutes (Civil Defence, MoWRE, Ministry of Health, MoAg, SMA, HAC) to form a nucleus for risk assessment and disaster managements. The UN- SPIDER program offered its support for capacity building in Disaster Risk Management through a training course which took place in May 2013 for 20 participants. The training explored the available data sources and open source software that support climate forecasting and early warning.

111. Furthermore, RSA is currently being supported by the Global Monitoring for Food Security (GMFS) project funded by the European Space Agency. The goal of this project is to build capacity within the Ministry of Agriculture and its partners in the optimization of agricultural surveys by the use of satellite earth observation. Satellite images are used to produce cultivated maps and indicative maps of crop activities.

112. In spite of its capacity and project support, RSA lacks high enough resolution satellite images to generate accurate land cover uses and yield estimates. Furthermore, despite investment in computer equipment through existing projects, licenses needs to be renewed to be able to validate crop yields and generate early warnings for potential agricultural problems.

Sudan Meteorological Authority

113. The technical National Meteorological Service in Sudan is the Sudan Meteorological Authority (SMA) which is responsible for establishing and maintaining the national weather and climate observation network. They are responsible for data collection, analysis and exchange as well as the production of weather and climate information and products (including warnings) to support social and economic development.

114. Presently, the weather and climate observation network managed by the SMA includes 20 synoptic Automatic Weather Stations (AWS), 8 agro-meteorological AWS and 4 climate AWS as well as 186 rain gauges (see Table 3). Meteorological data is received on a daily basis (8 observations per day) and rainfall data is collected in the morning (once a day) during the rainy season at 0600 Z (0900 am LT). The stations are mainly located in the state capitals or other cities (See Annex 9c). With a typical monitoring radius of 20 kilometres and only 1-3 stations located in each target state, more monitoring stations are required. Additionally, the network of volunteers manually reporting rainfall data in the field is in need of technical training on data transmission.

115. SMA's role is also to provide information on early warning on a daily basis as part of the regional climate outlook forum of ICPAC - Climate Prediction and Application Centre. As such, SMA produces agro-meteorological bulletins on a ten-day basis, with 3-7 day forecasts that mainly focus on drought and floods. SMA produces seasonal rainfall forecasts based on statistical models.

Table 3: Status of existing meteorological stations under the General Directorate on Meteorology in Sudan

Station type	Existing	Fully operational
Synoptic, manual	68	20

Synoptic, automatic	20	20 (being installed)
Agro-meteorological, manual	10	8
Agro-meteorological, automatic	10	8
Climate, manual	20 (all silent)	NA
Climate, automatic	4	4
Rainfall gauges	186	98
Radar	0	0
Radiosonde	3	0
Satellite receiving stations	2	2

116. For SMA, observation stations do not cover the spatial variability of the 5 different climate zones. Most existing stations are obsolete and in need of rehabilitation (with the exception of newly acquired stations acquired through the NAPA project). Also, as there is a shortage of modern and/or automated monitoring stations, data can be transmitted from existing weather/climate and hydrological stations only once a month. In the 6 targeted states: there are only 98 operating rain gauges. There are also 6 silent stations (synoptic and climate) and 162 silent rain gauges which need to be revived.

117. Furthermore, although the Sudan Institutional Capacity Programme: Food Security Information for Action (SIFSIA) project funded by FAO (2007-2010) built the capacity of SMA to have a downscaled, localized forecast called SAMIS, this programme was terminated at the end of 2012. Similarly, in 2010 the Meteorological Second Generation Satellite (MSG) was installed in SMA as part of the IGAD Climate Prediction and Application Centre (ICPAC) located in Nairobi under the project, AMESD, the African Monitoring of the Environment for Sustainable Development. AMESD had the obligation to provide required weather information to the Higher Council for Environment and Natural Resources (HCENR), the designated formal focal point for AMSED in Sudan. Upon completion, the PUMA project built off of AMESD project to make operational use of Earth Observation (EO) technologies and data for environmental and climate monitoring applications. However, at present, SMA does not have sufficient financial support to plan for the current phase of the African Monitoring of the Environment for Sustainable Development (AMESD) project, ***Global Monitoring of the Environment and Security Initiative for Africa*** (***GMES Africa***).

118. To overcome the insufficiencies of SMA, various on-going initiatives are trying to build satellite observation monitoring and forecasting capacities for both institutions. Relevant projects include the following:

119. SMA is currently self-financing the ***Vaisala*** project (USD 9 m, to be completed in 2013) by taking out a loan from a national bank. The project, being implemented by the Vaisala Company (Finland), is in the process of installing the following items:

- 30 AWSs, including 20 synoptic stations, 4 agro-meteorological stations, 2 marine stations and 4 climate stations where 28 stations of 30 will be installed at the key current operating stations and the remaining two (2) will be installed near Port Sudan Harbour for marine services. Forty (40) silent stations are required to be revived.
- 2 Upper Air stations (MW31 sounding system with GPS antenna).
- A Meteorological Information system.
- A Network and Communication Centre.

120. The ***Disaster Risk Reduction project*** (a baseline project discussed in Section 2.3.2) plans on improving the EWS/CI in Sudan by the procurement of equipment, capacity building and implementing flood and drought risk reduction strategies at state and community levels. Similarly, the baseline project ***Food Security Policy and Strategy Capacity Building Programme*** (discussed in Section 2.3.2) will address capacity gaps related to food security coordination, policy, budgeting and implementation capacity. Furthermore, a Finish Project- ***FISU*** (worth USD 513,000, to be completed in 2014) provided by the Finish Government aims to promote adaptation to climate change by reducing weather and climate-related losses through improved agro-meteorology services in Sudan.

FISU addresses issues of sustainable development and peace-building by promoting North-South cooperation at the Sudan Meteorological Authority (SMA).

121. The Famine Early Warning Systems Network (***FEWS NET***) funded by the U.S. Agency for International Development (USAID) is an information system designed to identify problems in the food supply system that could potentially lead to famine or other food-insecure conditions. The FEWS NET data portal provides access to geo-spatial data, satellite image products, and derived data products in support of FEWS NET monitoring needs throughout the world. Sudan exploits FEWS NET products, such as IPC Version 2 by FEWS NET and is contributing to the Integrated Food Security Phase Classification (***IPC***) project (EU).

122. However, SMA is not currently contributing to or involved with the development of FEWS NET. In contrast, the Humanitarian Aid Commission (HAC) is working with FEWS NET to provide baseline information for livelihood zones, under a side project funded by USAID (USD 150,000, 2013-2014).

123. In spite of these on-going initiatives, SMA has limited ability to use of hydro-meteorological information for making early warning systems and long-term development plans for rain-fed farmers and pastoralists in the target States. Furthermore, relative to the LDCF2 project, SMA has limited ability to have reliable data, including long data time series, necessary for triggering pay-outs for Weather Index Insurance.

Overall needs and insufficiencies of Sudan's NHMS

124. Despite the support of the associated baseline projects and in-house expertise, the National Hydro-Meteorological Services (NHMS) lack sufficient hazard monitoring infrastructure e.g. rain-gauges, weather stations, weather radars, flow gauges and satellite imaging capacities. No spare parts and few manuals are available, in particular for automated equipment. Very little equipment if any is automated. Furthermore, knowledge on the implementation of modern weather, climate and hydrological forecasting is still required in Sudan.

125. Sudan also lacks effective dissemination and communication capacities. Normally the technical departments publish warning data on their websites or share it with HAC and other ministries. However, there is no formalized communication protocol between national departments and HAC for distribution.

2.4.2 Adaptation Alternative Component 1 –With LDCF Intervention

126. Despite the poor collaboration among various Early Warning Systems (EWS), if well consolidated, the current efforts in EWS provide a solid baseline for improved observation capacity, seasonal forecasting and early warnings which can be delivered in efficient and relevant manners.

127. Accurate and timely weather and climate information is a key component to developing successful index insurance products. By enabling a reliable stream of relevant data that permits private sector entities to price contracts and determine index values, claims can be settled quickly. By supporting continuous weather/climate monitoring, insurance companies can minimize their "basis risk" by being able to validate claims so that insurance pay-outs match actual losses. Similarly, banks offering index-based insurance schemes through their specific microfinance products will also be able to promote the sustainability of monitoring networks due to the utility of using weather/climate information to reduce risks, thereby increasing chances of loan repayment.

128. In order to build upon the existing NHMS knowledge and capacities on modelling, data analysis and forecasting within SMA, RSA and MoWRE, Component 1 will support drought and flood forecasting in addition to land cover/crop monitoring. RSA and MoWRE will receive equipment, high resolution satellite images and training to better simulate localized flood forecasts. Similarly, synoptic and climatic weather stations will be procured to assist SMA in drought forecasting and early warning. All information production agencies will receive training on equipment operation and maintenance and modelling as well as training to budget O&M costs in the future. The

project will furthermore facilitate the validation of land cover satellite images and equipment monitoring in the field for all agencies. It will also promote data rescue so that more extensive weather/climate databases (longer time series) can be created. Such an approach will serve to support the continual verification and updates of weather indices used in weather-index based insurance.

129. SMA, RSA, MoWRE will also be supported to provide sustainable climate/weather services. SMA previously produced SAMIS forecasts combining rainfall and NDVI images to determine the onset of the growing season at national and state levels. In spite of their accuracy and localized information, production of SAMIS bulletins was terminated at the end of 2012 due to limited funding. As such, LDCF funds will enable SMA to revitalize and improve their targeted localized, SAMIS weather forecasts. Similarly, LDCF funds will support RSA to establish a farm management system in order to provide baseline crop and crop simulation information. Furthermore, SMA/RSA will gain expertise in predicting the onset of rains. As indicated in Stakeholder consultations during project development, such a prediction is of greatest interest to pastoralists because migration patterns depend on when grass and water are available (rather than average rainfall available over a certain period).

130. Finally, LDCF funds will be used to improve communication and data sharing among climate risk finance Stakeholders. As Stakeholder consultations indicated that there is limited coordination between information production agencies, a cloud data server will be purchased and developed so that technical information production agencies can share weather/climate/crop/land cover information with the Ministries of Agriculture and Livestock, the Humanitarian Aid Commission (HAC), MFIs, insurance companies, specific NGOs and extension services. The aim of improving data sharing will be to facilitate the generation of targeted information. Similarly, by coordinating with existing communication protocols, the LDCF2 project will work to facilitate the feedback of SRFPs to enhance advisories and record recommendations.

131. To enhance communication of weather/climate and agricultural information, a mobile phone partnership will be developed in the last two years of the project. Through this development, SMA/ARC will be able to provide weather/agricultural advisories by SMS to SRFPs. In order to determine the costs and benefits of forecast/advisory services, periodic rapid surveys of targeted users (SRFPs) will be conducted.

132. Specifically. LDCF2 funds will build on the above mentioned baseline projects (See Section 2.3 and above) in the following manner:

- Work with the National Early Warning Committee to be established in the ***Disaster Risk Reduction project*** (DRR) (See Section 2.3.2) to enhance the utility and efficacy of forecast/advisories. The LDCF2 project will build on the training for SMA, MoWRE and RSA on new technologies and data interpretation provided by the DRR project. The LDCF2 project will also exploit the SOPs on EWS dissemination prepared under DRR. The LDCF2 project will also build on the equipment acquisitions of the DRR project, ensuring that new equipment is placed in complementary locations. (New equipment from the DRR project will include warning dissemination equipment for HAC and Civil Defence offices and a computer cluster for SMA to perform weather analysis, forecasting and climate predictions.)
- Build upon the equipment acquisitions self-financed by SMA in the ***Vaisala*** project.
- Build on the ***Food Security Policy and Strategy Capacity Building Programme*** (FSPS) project by collaborating with the Ministry of Agriculture to integrate weather/climate information into food security policies and enhance the current ability of NHMS ministries to plan long-term budgeting.
- Build upon the remote sensing capabilities of RSA provided by ***UNOOSA*** and ***UNSPIDER*** initiatives and the former ***AMESD*** and ***PUMA*** initiatives.
- Use private sector investments and Government budget lines provided by micro-finance and insurance to support weather/climate monitoring in the long-term. This will complement the ***SISFIA*** programme which tailors its forecasts for aid planning in response to major disasters.
- Build on the ***IGAD-HYCOS project*** and the ***ENTRO*** programme by procuring and rehabilitating complementary equipment / stations and facilitating flood-based data sharing across sectors in Sudan.

- Continue exploiting and contributing to the ***FEWS NET*** data portal such as by providing more detailed risk and crop yield maps to be generated by RSA under the LDCF2 project.

Output 1.1: Rainfall modelling and simulations for six target states (River Nile, Gedarif, North Kordofan, and South Darfur, Kassala and White Nile States) to enable local flood forecasts and climate projections

Indicative activities include:

1.1.1 Procurement of 8 water level meters to be placed, 3 manual, hydrological stations and 2 acoustic Doppler flow meters (ADCP) for the Ministry of Water Resources and Electricity (MOWRE) to monitor water bodies used by pastoralists (e.g., Hafir and Rahad lakes) and wadi hydrology. (Note: As the targeted groups are rain-fed farmers and pastoralists, it is more critical to monitor wadi hydrology rather than river hydrology.) Equipment procurement includes purchasing sensors to measure evaporation, soil infiltration rates and runoff. Equipment costs include fencing and full-time local security guards to prevent theft and security issues. (For locations of network hydrological stations and water level markers see Annex 1).

Note: Salaries for existing security guards are paid by existing government budget lines. It is assumed that the government will continue to support salaries for newly recruited guards based on proper budget planning by NHMS.

1.1.2 Purchase of high resolution remote sensing data for RSA and MOWRE to provide a hydrological baseline in terms of delineating the drainage network and mapping agricultural and rangeland areas in the target vulnerable states to aid yield estimations.

1.1.3 Renewal and purchase of hydrological modelling licenses of hydromet software including training for nine (9) engineers with modelling software (RSA, SMA, MOWRE).

1.1.4 Purchase of CB radios, 200 mobile phones and SMS communication services to enable fast transmission of manually collected hydrological data.

1.1.5 Knowledge sharing between RSA, SMA and MOWRE on hydrological modelling.

1.1.6 Digitization of written hydrological/meteorological/climate/agricultural data for data rescue purposes and to facilitate the generation of climate predictions, weather forecasts and agricultural advisories (RSA, SMA MOWRE, ARC).

1.1.7 Training for of at least 10 MOWRI engineers, 4 SMA engineers and 3 RSA engineers on flow meter calibration in *wadis* and soil infiltration rate measurements. Training will go beyond typical manufacturer training on equipment installation and data collection by including the development of written Standard Operating Procedures for EWS monitoring and IT equipment .

Output 1.2: Procurement of 7 automatic climate stations, 6 automatic synoptic stations with telemetry and 162 rain gauges; purchase of high resolution remote sensing data; and capacity reinforcement related to new products/equipment to enhance the availability, quality and transfer of real-time weather/climate data on 130,000 ha of drought-prone land for purposes of drought forecasting and early warning.

1.2.1 Procurement and installation of 7 automatic climate stations 6 automatic synoptic stations with telemetry and 162 rain gauges for the Sudan Meteorological Authority (SMA), including improved data transmission/processing/storage facilities (via mobile SMS) from the stations directly to the server at the meteorological authority and to the RSA server. Costs include fencing and full-time local security guards to prevent theft and security issues, station testing every 3 months and a comprehensive inspection annually over the course of the project. Continual monitoring costs will be incorporated into government budget lines by the end of

the project. (Enclosure costs are approximately 1,000 USD per station.) (For existing and proposed station arrangements, See Annex 9c). Purchase of high resolution remote sensing data for risk mapping (e.g., less than 2 m resolution IKONOS or QICKBIRD images providing NDWI, NDVI, VegDRI and Palmer Drought Severity Index information) and renewal of licenses (e.g., to access AMESD data) to be able to predict droughts and the start of the growing season. Validation of soil and land cover / use satellite images using field observations to serve weather index and insurance needs.Training for 12 engineers / 8 technicians within SMA on new automatic climate and synoptic stations. Training will go beyond typical manufacturer training on equipment installation and data collection by including the development of written Standard Operating Procedures for EWS monitoring and IT equipment.Training in satellite-based crop and drought monitoring for 2 RSA technicians and 3 RSA specialists to build upon existing expertise using satellite products and to develop weekly drought forecasts. Training will also be conducted for IT equipment and servers.

1.2.6 Knowledge transfer between Sudan NHMS (RSA, SMA, MOWRE and the Ministry of Agriculture) and regional and international agencies on vegetation and drought monitoring (e.g., NOAA STAR center for satellite application and research, US drought portal)License renewal for the TAMSAT product including training by an expert on Cold Cloud Duration to effectively use satellite images to determine rainfall estimatesRevitalization of the Water Satisfaction Index project to assist with water balance calculations, to help assess and monitor crop conditions and produce yield estimates.

Output 1.3: SMA, RSA and MoWRE are trained to provide sustainable services on weather / climate observation, risk analysis, forecasting and early warning including the establishment of a farm information management system and the revitalization of targeted seasonal forecast delivery for rain-fed farmers and pastoralists;

1.3.1 Capacity reinforcement for SMA to produce forecasts (on hourly, daily and seasonal timescales for now-casting, daily/weekly forecasts and seasonal forecasts) is strengthened by training 8 meteorologists and 12 specialized technicians and promoting national and regional knowledge sharing on Numerical Weather Prediction models with international centers and regional centers including the revival of SAMIS bulletin production and relicensing for Eta and MM5. (The Government will assist with recruitment and will mandate that trained personnel must remain working within their respective institution for at least 2 years after training. Training of personnel will occur on national and regional levels.)

1.3.2 Formalized coordination with the UNDP DRR project National Early Warning Committee to ensure forecast bulletin or alert information is provided with pertinent information in useful quantitative units (e.g., crop yield, area of flood plain, wind velocity) for the rain-fed farmers, pastoralists, MFIs and insurance companies.

1.3.3 Revitalization of SAMIS targeted seasonal forecast by training local focal points to i) understand forecast jargon and ii) disseminate forecast information to Farmer/Pastoralist Trade Unions and other cooperatives.

1.3.4 Capacity reinforcement for SMA, RSA and MOWRE by a National financial expert on establishing sustainable cost-recovery mechanisms and long-term budgets with revenues generated from selling tailored weather/climate products and risk maps.

1.3.5 Establishment of a farm information management system to support Weather Index Insurance and decision-making on droughts including production of baseline soil and land cover/use maps using remote sensing and weather index based data to produce crop simulation models for each crop in each production region.Purchase and training on the Livelihood, Early Assessment and Protection (LEAP) software for RSA and SMA to combine ground weather station and satellite data to establish necessary livelihood-savings interventions (e.g., seasonal forecast improvements or early warnings prior to floods and droughts) and to assist with establishing indices for WII.

1.3.7 Incorporation of space-based information into Sudan’s EWS.

1.3.8 Gender disaggregated rapid surveys of targeted users of climate information conducted to understand the social and economic costs and benefits of using advisories and warnings to mitigate risks associated with agriculture and water management.

Output 1.4 Improved communication protocols and mechanisms (i.e. partnership with mobile phone operators) to provide timely and accurate weather and climate risk forecasts to rain-fed farmers and pastoralists in 6 target states.

1.4.1 Development of a standardized communication operation procedure (SOP) geared towards informing extension services, MFIs and the insurance sector.

1.4.2 Development of a mobile-phone partnership between SMA, ARC, extension service representatives and a mobile phone company so that rain-fed farmers and pastoralists can receive forecast/climate information and risk / agricultural / pest / livestock advisories by SMS.

1.4.3 Implementation of a formalized feedback mechanism so that local focal points in Extension Services and rain-fed farmer/pastoral organization heads (e.g. Farmers Trade Unions) can relay suggestions/comments on alert transmission, climate/weather information and agricultural advisories including the provision of regular information about drinking water supplies, grazing land acreage status and carrying capacities by pastoralists to NHMS and ARC. End-users will be able to provide feedback by SMS or contacting their local Extension Service focal points.

1.4.4 A public awareness campaign in each of the vulnerable agro-ecological states to promote the utility of climate information and the Early Warning System for adaptation to climate change and to introduce concrete ways in which the communities can get involved in project implementation and provide feedback.

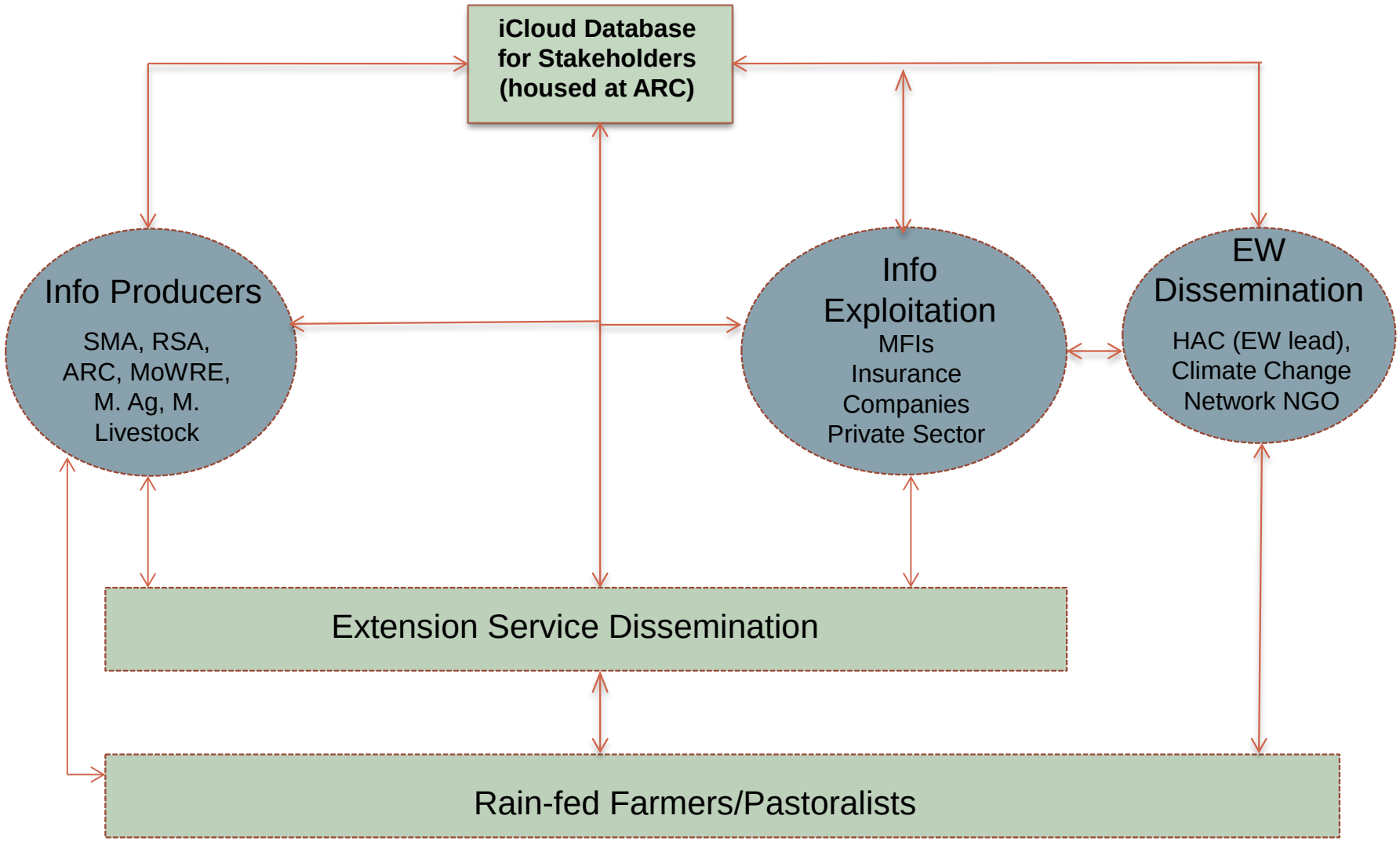


Figure 1: Information sharing scheme for early warnings, weather/climate data sharing and agricultural advisories as proposed by Stakeholders during the project development validation meeting.

Component 2: Capacities to design and deploy Weather Index Insurance to address residual risk and promote long term adaptation

Outcome 2:

Residual climate risk to rural livelihoods in the states of greatest rainfall variability addressed through parametric insurance products.

2.4.3 Baseline Component 2 - Without LDCF Intervention

133. Insurance is a particularly well developed industry in Sudan. Livestock insurance in Sudan commenced in the 1960s. The first Sharia-compliant (takaful) insurance company was established in 1979. Since these developments, in 2002, the Central Bank of Sudan and the insurance sector were subject to major reforms upon when the country introduced the Basel requirements for the banking sector and aligned them with Sharia principles. Only relatively recently in 2002/2003, in view of catastrophic risks and the need for government support, crop insurance was developed by the Sheikan Insurance and Reinsurance Company in Sudan.

134. In spite of the numerous years of experience in traditional insurance schemes, there is a full recognition of limitations in the current system particularly with reference to covering risks related to increased climate variability. Smallholder rain-fed farmers and pastoralists (SRFP) are very rarely covered under existing insurance schemes. For example, as seen by the list of products and whom they are covering below, it is clear that SRFPs are limited in their insurance options.

- **Existing agriculture insurance products:**
  - Multiple Peril Crop Insurance (MPCI).
  - The Crop Insurance Policies includes:
    1. Irrigated crop insurance policy
    2. Rain fed crop insurance policy
    3. Horticultural crops insurance policy
    4. Forest crop insurance policy
    5. Greenhouses insurance policy
    6. Sugar cane insurance policy
- **Clients covered:**
  - Large scale semi mechanized rain fed producers and companies.
  - Irrigated small acreage farmers. (gravity irrigation)
  - Horticultural tree gardens
  - Small farmers in rain fed zone of more than 450 mm per annum linked with financial credit
  - Producers societies and cooperatives

135. Based on this list, insurance companies are quite selective in choosing which SRFP are insurable. At present, SRFP need to receive more than 450 mm of rainfall per year to be insurable. However, in reality, SRFP in the plains of the River Nile State and the northern portions of North Kordofan, White Nile, Gedarif and Kassala states can receive less rainfall than 450 mm due to rainfall variability. In this case, SRFPs cannot access to insurance services to help build resilience to extreme events.

136. One of the underlying causes is that insurance companies are reluctant to cover high risk clients (i.e., SRFP) with existing insurance products. Experience of the insurance sector during the 2000 drought reinforced this reluctance when companies saw a 103% loss ratio for livestock insurance schemes due to high rates of claims submitted. Furthermore, in spite of the high potential for agricultural insurance in Sudan, evidenced by steady growth in insurance coverage, transaction costs for SRFP remain too high.

Transaction costs are expected to increase as climate related risks become more prevalent in scale and intensity. Insurance products are costly at present because 7% of the sum ensured must cover the insurance premium. There is also an unavailability of insurance agents in rural areas to deliver services and build awareness on insurance products due to the remoteness of rural populations.

137. For pastoralist production systems, the situation is particularly challenging. At present, re-insurance companies do not accept insuring livestock in open grazing lands. This leaves most nomadic pastoralists without any access to insurance or bundled MF/MI services.

138. Another issue lies within the slow product approval process by the Internal Sharia compliant committee which may take up to 4 months to approve a loan product before it is submitted to the Insurance Supervisory Authority for final approval. Also, the window in which farmers/pastoralists are able to report damage/losses is often so limited and the distances so long to reach Khartoum-based insurance companies that many claims are left unreported.

139. Furthermore, insurance companies do not have knowledge on how to develop new products targeting SRFP. Stakeholder consultations with insurance companies indicated that they are interested in piloting Weather Index Insurance. However, as climate risks vary from one state to another, the development and adaptation over time of weather indices used to judge pay-outs is complex.

140. The primary challenge with developing WII is how to establish the index. Events must be verifiable by high resolution satellite images or nearby weather station readings. For Weather Index Insurance, a long and high quality time series of meteorological data is required (approximately 30 years of uninterrupted data collection, automatic preferred). If station data is not available or in conjunction with station data, satellite data is more often used. The satellite data must be sufficiently down-scaled and accessible over long time periods. Piloting Weather Index Insurance requires reliable weather data observed fairly close to the locations of the farmer's risk exposure.

141. A secondary challenge is to ensure that good inputs are provided to farmers/pastoralists so that their productivity can be increased. In addition, extension services providing targeted and tested farming advice must be made available to farmers in order to boost their productivity. In fact, weather-risk management is enhanced when combined with properly functioning input and output markets, good governance in the management of strategic grain reserves, and adequate smallholder productivity.[21]

142. The third challenge is to cover the high upfront costs over the long-term. In theory, high upfront costs in developing WII will be minimized over time because administrator fees to perform individual loss assessments are not required with index insurance. By linking MF with WII, such costs can be minimized when adaptation packages are adopted enabling yields to increase as a result. As loans are more easily repaid, optimal inputs can be purchased further increasing productivity. Subsequently, as MF/WII products demonstrate their success more SRFP will be incentivized to enter such schemes. By creating economies of scale, the costs of MF/WII products can decrease over time.

143. An existing baseline initiative, ***Connecting Farmers to Market*** project, has managed to provide microfinance and micro-insurance to SRFP on a large scale (see Section 2.3.2). However, Stakeholder consultations in the field noted that compensation criteria are not clear under this traditional micro-insurance scheme. As a result, an increasing number of SRFP are opting to not use insurance.

144. Consequently, there are limited insurance services provided to SRFP which can be used to address residual risks inherent to agricultural and livestock production (Shiekan Insurance and Al-Tawania being the main active insurance agencies). Insurance coverage is enjoyed only by the wealthier segment of the agricultural sector, bypassing the most vulnerable farmers and pastoralists engaged in rain-fed agriculture and pastoralism.

[21] See MicroEnsure Feasibility Study (Annex 8)

2.4.4 Adaptation Alternative Component 2–With LDCF Intervention

145. Project Component 2 will focus on developing index insurance for climate risk management in the states of high rainfall variability where certain residual risks remain, even after adaptation measures are adopted (e.g., LDCF1 project). Weather Index Insurance (WII) is a finance mechanism which can be designed to address highly covariate climate risks (such as prolonged droughts and severe floods).

146. WII has been proposed as a new climate risk management tool to help people cope with weather/climate related-risks for a variety of reasons. In theory, product design is straightforward: a contract is written against an index establishing a relationship between lack of rainfall and crop failure, verified by long historical records of both rainfall and yields. Farmers collect an immediate pay-out if the index reaches a certain measure or "trigger," regardless of actual losses. Such an approach gives farmers an incentive to make productive management decisions.

147. As a result, the attraction of WII is that once developed, index insurance is less expensive to administer because on-site inspections and individual loss assessments are not required. Compensation becomes objective because farmer's cannot influence a claim (dependent on the efficacy of the index). Furthermore, the independently verifiable index enables reinsurance and facilitates insurance companies to transfer part of their risk to international markets.

148. By insuring against spatially correlated weather risks, WII facilitates the access of SRFP to financial instruments such as microfinance and savings. By developing tailored Weather Index Insurance products, local finance for adaptation can be unlocked by safeguarding loans against climate risks and thus making micro-finance services available to the most climate risk exposed rural communities that otherwise would have been considered too high risk to have access to financial services. Insurance thus enables SRFP to better protect themselves against weather risks and when linked with credit, can facilitate the diversification of activities to build resilience (e.g., purchase of more drought resistant seeds). Moreover, if properly designed, WII can mitigate food security shocks by serving as a source of emergency financing when area-wide drought/flood catastrophes take place.

149. In order to conquer the aforementioned challenges in developing WII, Component 2 will focus on the development and pilot testing of 6 Weather Index Insurance (WII) products in the different livelihood zones of each project State with the assistance of the Shiekan Insurance and Reinsurance Company and the Al-Tawania Insurance Company. Shiekan can provide lessons learned on how to best implement aspects related to crop and livestock insurance while Al-Tawania, due to its experience in the Connecting Farmers to Market project, can recommend how to best manage a micro-insurance scheme.

150. To begin with development of WII, a field study on how to improve input delivery, value chains and lending services will be conducted. The study will focus on how to best link inputs, extension services and credit with WII so that agricultural/livestock production can be maximized. Also, LDCF funds will be used to sponsor a study tour of a functional WII market in a developing, Islamic country. Based on these studies, the legal and regulatory framework for risk transfer will be analysed so that policies can be adapted and reinsurance secured. Policies must also be revised so that clear compensation criteria can be developed based on best practices to monitor and validate weather indices in each state. A formalized partnership with the Connecting Farmers to Market project (and thereby their experiences with micro-insurance) will assist with collecting and integrating lessons learned to develop revised criteria. Regulators and policy makers will be trained on these new policies so that they can implement the regulatory scheme for WII. The internal Sharia Committee will be trained on WII in order to expedite the current, lengthy loan approval processes.

151. In developing the weather-based indices, each climate zone and the particular economic and social characteristics of the target populations will be analysed. In cases where no weather station data is available, satellite data will be used. In addition, consultations with local populations will be conducted so

that climate/weather trends and drought/flood impacts in each target region can be fully understood. Particular attention will be paid to creating an index which is adaptable to various regions so that it can be easily scaled-up and high upfront development costs can be recovered. A pre-feasibility study by MicroEnsure (Annex 8) indicated that the ranking of droughts in terms of severity matched the TAMSAT satellite database.[22] As such, the purchase of TAMSAT products will be supported by LDCF funds to serve to validate triggers for index based payments. Further assessments during project implementation are required to assess how accurate TAMSAT is for the targeted areas.

152. Based on the pre-feasibility study conducted by MicroEnsure during project development (See Annex 8), initial screening indicated that the application of a Weather Index Insurance (WII) product is appropriate in Sudan because drought/flood risks are spatially correlated. In other words, villages within the same region are subject to the same weather/climate conditions. Consequently, the basis risk is low because an index can be determined to judge losses for the same region.

153. The pre-feasibility study established that approximately 1% of subsistence farmers, 10% of mixed crop farmers (i.e., those who cultivate cash crops and subsistence crops) and 2% contract farming ((i.e., those that are supported by a delivery agent who provides seed and farming guidance in return for cultivated crops) can be targeted by WII products in the 6 target states. In total, approximately 45,000 farmers are likely to be covered by the WII products. However, it should be noted that the study was unable to indicate how many pastoralists can be targeted because WII has not yet had success for pastoralists in developing countries where generally pastoralists hold on to their livestock for security. An additional study is therefore required to determine the demand of pastoralists for WII (See Output 2.3, Activity 2.3.1).

154. During the development of WII products, time and resources will be invested in explaining how they work (particularly focusing on costs and benefits, risks and opportunities). The LDCF2 project will support extensive training series for the beneficiaries to raise their awareness and financial literacy as well as to cultivate trust in this new financial product for climate risk management. Specialized biannual training sessions will be organized for the MFIs to cover the main elements of index-insurance such as (i) indemnity payments under the contract; (ii) a payoff structure that defines the relationship between the index and indemnity payments; (iii) basis risk; and (iv) low cost index insurance deployment models.

155. The project also includes the development of a nationally based WII product development team who will be able to facilitate insurance outreach and improvements for WII products. The team can include insurance experts seconded from Al-Tawani or Shiekan so that the capacity of nationally-based insurance providers will be reinforced. The role of the team will be to train farmers and pastoralists (including trade unions and extension services) as well as banks, MFIs, NGOs and insurance companies. Simultaneously, they will obtain feedback from farmers and pastoralists and conduct Monitoring and Evaluation of products on-site. Ample budget and time have been allotted for the national based WII development team (with assistance from an international WII development firm) to obtain feedback from rain-fed farmers and pastoralists so that products can be improved.

156. Product development and pilot testing will occur in a staggered manner (1 product developed in the first year, 2 products during the second and third years and 1 product in the fourth year). Such an approach will provide time for the WII developers to target the WII products to the livelihood needs and to incorporate lessons learned from previous WII pilot trials. See Weather Index Insurance Stakeholder map (MicroEnsure Feasibility Study, Annex 8).

157. Furthermore, throughout the implementation stage, the project will need to host a series of workshops where staff members undergo training, (branch managers and agri-business managers). Banks and MFIs will also play a participatory role in the design of bundled loan and WII products. Banks and MFIs could become clients that purchase Weather Index Insurance on behalf of farmers and pastoralists.

[22] MicroEnsure Feasibility Study (Annex 8)

158. Significant budget will also be included to train insurance companies such as Shiekan Insurance and Reinsurance Company and Al-Tawania Insurance Company so that they can adapt the products based on any updates to weather station, satellite and/or new crop data. Training (including a Study Tour) will be provided to the nationally-based insurers and brokers so that they can underwrite Weather Index based Insurance, conduct a public awareness campaign on the utility and importance of agricultural insurance services for SRFP and assist in the development of presentations and brochures. To improve outreach to rural regions, LDCF funds will be used to increase the number of market outlets and insurance agents and to develop mobile banking/insurance services.

159. Also, an outreach strategy and training syllabus will be created for WII so that Training of Trainers (TOTs) can take place in each state (e.g., TOTs are likely to include 4 regional insurance agents and NGO representatives). The TOTs will then train cooperatives, farmer/pastoral trade unions, extension services and group leaders on WII.

160. Using group leaders for insurance product training has advantages: group leaders are often more literate and numerate than other members of the group so they may be able to understand the products quickly in a training session and can then communicate the key concepts effectively to other members. By vouching for the insurance products, they can increase trust in the insurance products among other members of the group.

161. The LDCF2 project will furthermore support an increase in the number of insurance/financial service market outlets including mobile units so that SRFPs in remote areas can be reached and have access to climate risk financial services. The project will also support an improved relation between the banks/MFIs and input suppliers. This will be in the form of creating farm input packages, where the farmers receive their loan in the form of seeds, fertilizers and pesticides. Such an approach was shown to be a success in other developing Islamic developing countries who have adopted WII products[23].

162. Similarly, the project will promote collaboration between the Ministry of Agriculture and the MFIs/insurance companies. The Ministry of Agriculture's (MoAg) agri-extension officers will be used to conduct effective marketing and training programmes to farmers. The project will also work in collaboration with the MoAg on national and state levels because as evidence has shown, the MoAg could become a key developer for Weather Index Insurance when used for food security[24].

163. Overall, WII has the potential to protect food security on both macro and micro levels. On a macro level, the Government will be able to mitigate the financial consequences of a food security shock by purchasing an area-wide product that could generate a supplemental source of emergency financing to support existing resources at the country level. Distinct advantages that can be achieved through index-based ex-ante financing include; immediate cash payment, structured rules for payment, improved correlation between need and provision, flexibility of cash payments, risk assessment and mitigation and targeted assistance to problem areas. On a micro level, farmers and pastoralists will be able to purchase Weather Index Insurance as part of a credit-enabling package, which will allow them to access a loan to purchase high quality agricultural inputs. This leads to increased productivity and additional income for farmers, allowing them to diversify their economic activities and better protect themselves against weather risks (for example, increased income could lead to purchasing irrigation equipment). In the event of a weather shock, farmers and pastoralists will be able to quickly receive cash and, depending on the season, will be able to purchase new inputs or food produce and household goods directly.

164. In the long-term, relief agencies can link up with the index-insurance scheme and select a weather-based index that can effectively serve as an early or lead indicator of an emerging crisis. This will help avoid the usual delays incurred when relief agencies must first demonstrate an emergency and then appeal for donations from governments and donors. In case of disasters of catastrophic scale, timely

[23] http://www.cgap.org/blog/reaching-small-farmers-through-innovative-finance-pakistan

[24] MicroEnsure report

mobilized relief funds and government resources from Sudan's Social Fund can provide hedging for the insurance.

165. To support WII development. LDCF2 funds will build on baseline projects (discussed in Section 2.3.2) in the following manner:

- LDCF2 funds will build off of lessons learned in the traditional micro-insurance scheme implemented by the Connecting Farmers to Market project. Lessons which will be incorporated into the LDCF2 project include detailing which compensation criteria are not clear, how to develop better outreach mechanisms and target different crops as well as how to effectively distribute insurance in the case of common states. A formalized partnership will also be built between the LDCF2 and Connecting Farmers to Market project (Activity 2.2.6).
- LDCF funds will also build off of Shiekan's experience in providing multiple peril crop insurance and livestock products to small holder rain-fed farmers and pastoralists. Shiekan has extensive understanding and capacity to carry risk as demonstrated by their ability to provide 40,000 SRFP in the Blue Nile, White Nile, North Kordofan, North Darfur, South Darfur and West Darfur states in 2011. The LDCF2 project will build the capacity of Shiekan's personnel to understand and manage new Weather Index based Insurance products by training insurance agents in each state. The products will be marketed and distributed using Shiekan's existing network of branches and offices as well as the additional rural outlets to be developed in the LDCF2 project.

Output 2.1 Comparative analysis and feasibility assessment of different business models for index-based insurance

Indicative activities include:

2.1.1 Feasibility assessment over 3.5 months to test the viability of an insurance scheme by going to the field and identifying 5 to 10 value chains, exact number of farmers, use of inputs, main risks, aggregators and the organization of farmers
2.1.2 Study on how to improve delivery of inputs including local distribution of drought resistant seeds and link credit and lending to activities which support building resilience and adaptation to climate change
2.1.3 Field validation to see if the farmers get their inputs on time and if/how they are being delivered in order to develop insurance premiums

Output 2.2 At least 6 index based risk transfer products (e.g., Weather Index Insurance) designed and introduced, covering at least 45,000 farmers and pastoralists who depend on rain-fed farming systems, including the creation of a nationally-based WII marketing and development team.

2.2.1 Study on demand of pastoralists for microfinance and insurance Design of at least 6 tailored Weather Index Insurance products, based on the livelihoods in the 6 target zones. The products will be suitable to the changing climatic conditions in the areas affected by climate change and suitable to small farmers economic and social characteristics i.e. collateral requirements
2.2.3 Development of a nationally based WII marketing and development team associated with the WII international specialist organization. Members of the team shall include a country manager, a client's relation manager, claims manager, IT administrator and a finance assistant. The team will be housed in a country office with IT and travel support (costs covered by the project)
2.2.4 Identification of farmers and pastoralists willing to participate in WII schemes and to accept the conditions of the loans

2.2.5 Training for local insurers and local brokers to enable them to adapt and underwrite Weather Index Insurance contracts
2.2.6 Training for the Internal Sharia compliant committee so that the loan approval process can be decreased from up to 4 months to a period of one week
2.2.7 Development of guidelines and manuals for approved products
2.2.8 Purchase of an Cloud secure data service for RSA, SMA MOWRE, ARC, the Ministry of Agriculture, the Ministry of Livestock, HAC and MFIs/Insurance companies to access flow, meteorological, climate and satellite image data related to seasonal drought forecasts, flood warnings and climate predictions
2.2.9 Transfer of data into the Cloud data server to serve as a national weather databank
2.2.10 Facilitation of data sharing between all institutions managing hydro-meteorological equipment and MFIs/Insurance companies including the creation of a data link between RSA and the existing EWS in Sudan and linking two-way data transfer between MFI / insurance companies and SMA/RSA/ARC/MoWRE
2.2.11 Development of a toll-free number complaints service to assist SRFPs in the event of dispute
2.2.12 Study tour to a South-South cooperative country (e.g., India or Pakistan) to understand and see a mature

Output 2.3 Insurance literacy programme / awareness campaign designed and delivered to small businesses, community-based organisations, local farmers and pastoral communities

2.3.1 Development of an outreach strategy with a two-day workshop with key distribution Stakeholders such as banks/MFIs and cooperatives
2.3.2 Production of training syllabus on the WII products, specific to each livelihood zone
2.3.3 Public awareness campaign (by insurance representatives and humanitarian organizations (e.g., Practical Action)) to provide awareness and education on the utility and importance of agricultural insurance services for Farmers and Pastoralists Trade Unions. This should include slots on agricultural radio shows, local road trade shows where information films are shown and training and sales staff are on-site to answer questions and sell policies
2.3.4 One-week training for 4 regional insurance focal points on Weather Index Insurance in each state
2.3.5 Series of training courses led by the TOTs in each implementation zone for farmer cooperatives, extension officers and lead farmers including presentations, product brochures, leaflets and comics run. Feedback sessions and interviews with farmers should be planned to see if the index accurately captures the risks faced by the target SRFPs
2.3.6 Increase in the number of market outlets and insurance agents in the rural areas to disseminate insurance awareness and deliver services, including by the development of mobile banking/insurance services
2.3.7 Monitoring and Evaluation including regular supervision of activities and ensuring compliance to pre-agreed project plans and deliverable dates.

Output 2.4 Legal and regulatory framework for risk transfer in 6 target states assessed, policy recommendations developed and reinsurance secured

2.4.1 Training by a WII specialist with regulators and policy makers in order to develop a suitable legal, regulatory and policy environment for WIID development of a white paper detailing recommendations for changes or additions to existing legislation

2.4.3 Framework workshops with regulators and policy makers to set out the next steps for drafting a suitable Weather Index Insurance regulatory document
2.4.4 Creation of regulatory policy document to set out the types of Sharia-compliant products that may be developed and include a robust dispute resolution process
2.4.5 Implementation of regulatory scheme in accordance with the laws of Sudan
2.4.6 Development of partnerships with projects which can facilitate the link between micro-finance and micro-insurance and savings (e.g., ABSUMI project) and with partners who can facilitate outreach to SRFPsInternational reinsurance company agreement secured to share/transfer catastrophic risks under the condition of traditional farming and livestock productionDevelopment of clear criteria for compensation regarding risks including rainfall thresholds per state to determine compensation and standard practices on how to use weather station/satellite data in each state for monitoring weather indicesEnvironmental Impact Assessment according to the Environment Protection Act 2001

Component 3: Financial service provision for farmers and pastoralists to increase adaptive capacity of rural livelihoods

Outcome 3:

Improved access of vulnerable farmers and pastoralists to financial services for climate change adaptation and disaster risk reduction

2.4.5 Baseline Component 3 - Without LDCF Intervention

166. Microfinance cooperatives, CBOs and specialized banks have been in existence for several decades in Sudan (the Savings and Social Development Bank of Sudan (SSDB) developed guidelines for the implementation of MF in 1974). Since the mid 1970's, the Agricultural Bank of Sudan (ABS) has been working with rural poor communities in remote areas through cooperation with international development agencies. ABS partnerships with IFAD in the traditional rain-fed sector started in the 1980's through the En Nahud Cooperatives Development Project. Since then, ABS has established credit linkages with community managed financial intermediaries including *sanduqs*, village development committees (VDCs), and savings and lending groups. Through these partnerships ABS has been exposed to a diversity of rural financial markets, has developed an understanding of the type of products and services needed and has applied group guarantee systems.

167. Recently, the MF sector was revitalized in 2006-2007 when the Government of Sudan endorsed MF as a central element of its financial policies to support poverty reduction. In 2006, as a follow-up to this policy direction, the Central Bank of Sudan (CBOS) commissioned a situation analysis study on MF in which it formulated a strategy to develop and promote the MF sector in Sudan. The strategy "A Vision for the Development and Expansion of the MF Sector in Sudan" was implemented between 2007 and 2010. The strategy's goal was to: "facilitate sustained access to financial services for the economically active poor in rural, semi-urban and urban areas by expanding and developing the microfinance sector in a cost-effective, gender sensitive and sustainable manner."

168. Effectively, in 2007, the Microfinance Unit at the Central Bank of Sudan was established and is presently responsible for executing CBOS strategy to develop social and economic banking in urban and rural areas through MF with the aim of eliminating poverty and increasing economic development according to the Comprehensive Peace Agreement (CPA). The unit has issued several directives to banks to deliver microfinance services so as to increase the extension of financial services to the economically active poor. The most influential directive has been to mandate banks to allocate 12% of their annual lending portfolios to microfinance. Of this 12%, 70% should be allocated to rural areas for financing crop production, livestock production, fisheries and non-agricultural activities. As of 2012, total resources allocated to MF by the CBOS totalled SDG 350m with total expenditures of SDG 272m spread over

investments to i) build capacity in Sudanese development banks, ii) empower rural women in association with the Ministry of Social Welfare (SDG 74m) and iii) co-finance with Islamic Development Banks for MF institutions (SDG 10.5m).[25] The low utilization of microfinance resources has been due to the fact that the commercial banks consider microfinance not profitable due to high transaction costs. Banks are also reluctant to engage with Microfinance Institutes (MFIs) which have weak capacities to manage loans.

169. To facilitate CBOS fund distribution and develop the microfinance sector, the Government supported the establishment of the Sudanese Microfinance Development Facility. Recently, SMDF became a private entity and is now known as the Sudanese Microfinance Development Cooperation (SMDC). The mission of SMDC is to ensure outreach to microfinance through strengthening the technical and financial capacities of the MFIs, linking their programs with Sudan's macroeconomic policies and priorities. Currently, SMDC is overseeing the activities of the Connecting Farmer's to Market project through a project coordinator who is guiding the central technical committee and supervising the work of state committees. SMDC's role is also to provide flexible and carefully-designed financing to qualified, high-potential microfinance institutions for institution-building, systems development, and on-lending. Both existing microfinance operations as well as start-ups are eligible for funding. Presently, all funding is provided by the CBOS, but SMDC plans to work with international donors to establish more credit lines.

170. As evidenced by the CBOS budget for MF, there is a plentiful supply of cheap capital for MF lending which is largely under-utilized by the majority of the rural population who is dependent on natural resources. (Microfinance in Sudan is largely supply-driven and government-subsidized).

171. To date, only a small portion of this amount has reached the people most in need, due to a persistent tendency of not providing loans to groups which are perceived as 'high risk'. As a result, microfinance service provisions are very limited for rain-fed communities with the exception of a few NGOs and CBOs that provide retail microfinance. Moreover, agriculture input financing through loans and micro-credits is very rare.

172. According to the UNDP and the Policy Assessment, Consultancy and Training (PACT) national assessment on MF in June 2012, ***Mapping, Capacity Assessment and Capacity Development of Microfinance Providers in Sudan,*** capacities for Value Chain Analysis are lacking and capacity of Microfinance service providers, particularly banks, in the development of products is weak in Sudan. The main products for banks are traditional credit products. These products are generalized to all clients and do not fully consider the nature and type of activities. Also in terms of technology most of the banks rely on traditional core banking systems, which do not have the ability to access the poor who are generally located in remote areas. Furthermore, training programs are also limited, and extension and Business Development Services (BDSs) require massive capacity building.

173. One of the biggest challenges is that MF products and services from formal providers are not customized to suit the needs of targeted local communities, thus giving an advantage to informal providers. Also, there is no legal framework in the area of non-traditional guarantees and inexperience in working with complementary micro-financing services (i.e., savings and insurance).

174. Furthermore, knowledge and capacities are missing at the MFIs, NGOs and insurance companies to develop and deliver coupled micro-finance/micro-insurance schemes. There is currently limited awareness on how insurance can be used to address residual climate risks when complemented with

1. [25] Sudan's MF sector is governed by the Islamic banking system. Through this system, called Shariah, banks cannot charge interest. Rather they can obtain a profit margin from selling crops. In this system, the farmers/pastoralists do not give back money but provide in-kind payments (e.g., selling the crop). In Sudan, the Islamic Development Bank is taking an active role in capacity building for MF intermediaries to setup an inclusive MF Sharia'a compatible system in favour of MFIs.

microfinance. As a result, there is little public funding available for feasibility assessments, capacity building and product development.

175. Stakeholder consultations in the 6 target states indicated that rural populations limit taking out loans from MFIs due to lack of collateral and lack of knowledge/understanding on the bureaucratic procedures and regulations. They also found that the existing products were not flexible during periods when no income could be gained (e.g., planting period).

176. Another issue is that MF is not linked with adaptation technologies which have been proven to improve productivity and increase resilience to extreme weather for SRFP. In fact, micro-finance and adaptation technologies can be seen to go hand-in-hand. Access to micro-finance enables rain-fed farmers and pastoralists to purchase the equipment which can help build their resilience to climate change (e.g., rainwater harvesting equipment, more drought-tolerant seeds). At the same time, by using technologies which are more climate-resilient, farmers and pastoralists are more likely to not default on their loan repayments.

177. Development of MF in Sudan is also polarized. Within Sudan there are formal and informal MF services. Loans from informal lending sources (Shail system) are widely spread. This is an old practice whereby small holders sell part of their expected crops to agricultural crop traders (known as Salam in Islamic banking). This informal system is flexible in terms of adapting to local circumstances which suit the farmers/pastoralists in terms of product, amount, timing, coverage and loan non-repayment. An example of informal lending flexibility was provided in the PACT assessment where 75% of informal cases in a study sample showed some sort of personal guarantee rather than real collateral being promised.

178. There are over 6 million potential microfinance customers in Sudan, yet the number of current clients is approximately 400,000. Most of the microfinance service providers are concentrated in states with lower poverty rates and few are located in rural areas. Of the total 400,000 microfinance clients covered in the year 2012, only around 93,000 i.e. 23% were rural clients. The rural clients covered represent around 6% of the rural and nomadic households of the project area excluding the River Nile State. Therefore, rural area microfinance is a relatively untapped market in Sudan.

179. As shown in Table 4 approximately 55% of rural clients in 2012 were served by Agricultural Bank of Sudan (ABS) branches and the ABS Microfinance Initiative. This is no coincidence because lending to farming and livestock production is mandatory for ABS. The remaining farmers/pastoralists were served and continued to be served by the CBOS microfinance programme, ***Connecting Farmers to Market*** (See Section 2.3).

Table 4: Number of rural farmers in the 6 target states engaged in microfinance during 2012

Household Population of the project area		
Banks	No of clients	% of Total
The Agricultural Bank of Sudan	36,637	39%
The Savings and Social Development Bank	0	0%
The Farmers Commercial Bank	0	0%
Bank of Khartoum	19,000	20%
The Sudanese Rural Development Company	8,200	9%
Kassala Social Development Fund	14,873	16%
The Agricultural Bank of Sudan Microfinance Initiative (ABSUMI)	14,972	16%
Total	**93,682**	**100%**

2.4.6 Adaptation Alternative Component 3–With LDCF Intervention

180. To improve productivity and increase climate resilience of SRFP, Component 3 will focus on the development of at least 6 adaptation packages linked with MF services in each target region. To develop the packages, lessons learned from adaptation technology applications by Farmer's Field Schools will be documented. The technologies will then be validated on-farm whereby they must show an increase in sustainable crop and livestock production and incorporation of local knowledge on appropriate agricultural/livestock practices in order to be deemed acceptable.

181. The ARC and Extension Departments will jointly be responsible for delivering adaptation technologies. Accordingly, the project will support the Agricultural Research Corporation (ARC) and the Agricultural Extension Departments in the respective states to test and spread adaptation technologies including for dry-land adaptation for pastoralists. On the national level, 163 researchers and Agricultural Extension officers will receive training, including 14 women. On the state levels, the following number of researchers and Agricultural Extension officers will be trained: Kasala; 5, Gedarif 6, River Nile: 20, White Nile: 3, North Kordofan: 15 and South Darfur: 4. The Project will support ARC and Extension Departments in each state to establish demonstration farms to exhibits the best practices of adaptation technologies for both crop and livestock production. These demonstration farms will be combined with Famers Field Schools. The ARC through its Agricultural Socio-Economic Experts Cadre will ensure that adaptation technologies delivered are economically viable and socially acceptable. In order to effectively disseminate the adaptation technologies to rain-fed farmers and pastoralists, technical manuals detailing sustainable agricultural and pastoral activities for year-round cultivation and production of milk/meat products will be prepared and distributed by ARC.

182. Simultaneously, at least 3 microfinance, flexible loan products will be designed and pilot tested to account for pastoral mobility and seasonal income cycles of local farmers. To ensure the products will be accessible to SRFPs, loan conditions and regulations among MF providers will be unified ensuring flexible terms. Similarly, the adoption of climate change adaptation technologies will be mandated as a pre-requisite for obtaining access to credit/insurance services.

183. In order to disseminate the MF products, mobile banking, pastoral GPS tracking and mobile-phone advisory services will be developed. Also, Agricultural Extension and Technology Transfer Administrations (AETTA) and Training of Trainers (TOTs) will receive capacity development on how to organize SRFPs and train lead farming/pastoral focal points. A financial services manual will be designed for SRFPs to build their financial literacy on conditions for micro-credit access, credit by-laws, loan/insurance/savings products and repayment schedules. Subsequently, SRFPs will be organized and trained by lead farmers, farmer/pastoral trade unions and Farmer Field Schools in order to facilitate their access to extension services, adaptation technologies and MF/MI services.

184. In order to provide incentives to banks to provide MF services to SRFP, they will be organized into groups so that they can have collective collateral. NGOs will serve to assist with the organization of SRFP.

185. The cornerstone of this project will be to effectively link MF products with the tested WII product(s) developed in Component 2. As a WII product has never been successfully introduced in Sudan, MFIs and banks will receive significant training on how to pair MF and MI services together. At the same time, regulatory processes will be streamlined so that loan repayments become more efficient.

186. The role of micro-finance in delivering index insurance is significant, either through the banks and their micro-finance facilities or community funds – sanduqs. Without bundling insurance with credit, many farmers will lack both the capital to pay the insurance premium and sufficient incentive to use

scarce resources to buy risk coverage. Placing insurance products within complementary systems with broader linkages can also facilitate simpler contract design, as other mechanisms which can deal more efficiently with the subtle aspects of risk and crop losses that cannot be indexed.

187. Therefore, establishing the linkages between farmers, insurance and credit providers will be critical for the success of the refined scheme. When lenders know that borrowers are covered by insurance, they will more likely extend credit to them opening the opportunities for rural populations to make investments that may raise their productivity, especially if the latter is incentivized by the insurance scheme as part of the requisite climate risk management conditionality spelled out in the contracts. In package, together with index insurance, MFIs become more willing to take risks and give loans to the most vulnerable SRFP for agriculture inputs.

2.4.6.1 Pastoral Production Systems and Microfinance

188. Sudanese lenders have an unexplored, potential market with pastoral production systems. Dryland pastoral/nomadic livestock production systems are unique in their ability to take advantage of ecosystems where unpredictable variability is a characterizing feature. As global climate change is increasing extreme weather variability, dryland livestock production systems can be considered increasingly valuable because of their capacity to turn environmental instability into an economic asset.[26]

189. In fact, the economic value of the livestock sector includes various activities other than animal production, such as the production of livestock dung for fuel, the use of animal power in agriculture and transport and the value of livestock's financial services such as savings and investment, credit, insurance and risk pooling. Pastoralists very frequently use their livestock for risk pooling. Numerous rural people make their living along the livestock value chain including primary producers, trade operators, transporters and drovers, hides and meat processers, feedlots, and markets in water and fodder. Women also have important roles in pastoralist societies, from rearing the livestock kept at the camp (e.g., goats and young animals) to fetching water and firewood. In total, it has been estimated that there are at least 2.7 million nomadic herders making their livelihoods off pastoral production systems in Sudan. This figure is likely to be much bigger (perhaps 4 times bigger) because there are many additional households using subsistence services and other economic services from pastoral livestock.

190. In spite of the prevalence and benefits of pastoralist production systems and value chain activities, if not supported, pastoral systems will continue pulling out of the mobile production system, tending to compete for scarce land for farming or be lured into the unsustainable gold mining industry. In Sudan, with each generation, between 15 and 25 percent of pastoralists leave the production system because they are lured to cities or to get "rich quick" in the gold industry. This trend has been exacerbated by the fact that, at present, there is a transfer of productive livestock towards management systems that offer the highest returns, so called 'investment marketing'. The result is that there is an increasing gap between wealthy and poor within pastoral groups. The consequences are dire including the loss of expert knowledge and a poor understanding of specialized dry-land animal production. These losses are exacerbated by the commercialization of capital stock which has opened up the system to outside investors and absentee owners with little or no ties within the pastoral society.

191. In order to support pastoralism, there is a need to provide capital to pastoralists in order to deal with rising costs of production, including the costs of feeding, watering and moving animals. These costs are becoming an increasingly heavy burden on less secure pastoralist households, particularly those in poverty who are faced with epidemics or drought spells.

[26] Feinstein International Center, Tufts University and UNEP Study, *Standing Wealth: Pastoralism Livestock Production and Local Livelihoods in Sudan*, 2013

192. Indeed, microfinance can be used to support the rising costs of water and crop residue (for feeding livestock) which are becoming paid-for-services due to the conversation of rangelands to other uses. As an example, MF could be used to support the purchase of large water bags or bladders known locally as "girab" which are the size of inflatable boats. For the past 5 years, herders have placed these bladders strategically to serve their camps or to enable animals to exploit otherwise unusable good quality pasture. One full bladder has been shown to have enough supply to water 300 sheep over 45 days in the cold dry season and 30 days during the hot, dry season.

193. The development of tailored microfinance products for pastoralists can provide the necessary capital to deal with rising costs and paid-for-services. Tailored products need to be flexible for pastoralists because pastoral/nomadic movements are particular. With few exceptions, the only time in the year in which livestock on rain-fed pasture in Sudan can put on weight is between the growth of the first grass (June) and the beginning of the cold dry season (December). At this time, nomadic pastoralists are more sedentary. This means that there is a relatively small window of opportunity for financial services to mobilize cost-effective outreach to the pastoralists at this time when they move as little as possible. Furthermore, the livestock market has a seasonal variation. Trading seasons can range from 3 to 6 months which limits the time when pastoralists can pay back loans.

194. LDCF funds will be used to support the development of flexible MF products for pastoralists. The MF products will consider loan repayment schedules relative to when the trading season takes place. They will also consider the known migratory patterns of pastoralists (see Annex 9d) and the times when pastoralists are more sedentary on rain-fed pasture. To support the detection of migratory movements, LDCF funds will be used to support GPS tracking of pastoralists in order to facilitate outreach and financial service support (Activity 3.1.8).

195. It should be noted that the demand for Microfinance and Weather Index Insurance by pastoralists is unknown. As such, LDCF funds will be used to support an in-depth study to determine this demand during project implementation (Activity 2.3.1). This study will lay the foundation detailing how financial service providers can optimally serve the needs of the pastoral production market and its associated value chains.

196. In addition, although the development and incorporation of WII into a financial services package will be new, it should be stressed that this project will build off two successful MF initiatives. Both the ABSUMI and the Connecting Farmers to Market initiatives have successfully provided loans to farmers and agro-pastoralists. ABSUMI has also successfully established a savings program while the Farmers to Market project has combined MF with MI.

197. LDCF funds will build on these baseline projects and country initiatives in the following manner:

- Building on the ***Agricultural Research Corporation's*** (ARC's) expertise in improving production technologies and in facilitating the distribution and adoption of approved technologies dealing with crop and livestock production. ARC has developed adaptation technologies for land preparation, irrigation, water harvesting, rangeland and pasture improvement, plant and animal nutrition, pest and disease control, and agricultural engineering. Acting as the technical operational arm of the Ministry of Agriculture, ARC has significant experience in assisting Extension Services such as through the Seed Development Project where it is responsible for seed propagation and testing. In return, the LDCF2 project will support ARC and Extension Departments in each of the 6 states to establish demonstration farms to exhibit the best practices of adaptation technologies for both crop and livestock production and to scale-up the distribution of these technologies.
- Building on the ***ABSUMI*** initiative will enable the LDCF2 project to coordinate with the rural women who already have access to microfinance and savings services. These women are target customers for WII financial services by combining WII with their current MF products. The

LDCF2 project will build a formalized partnership with the ABSUMI initiative to be able to effectively coordinate together to avoid duplication of activities and target areas so that the maximum number of beneficiaries is ensured (Activity 2.2.6).

- Collaborating with the ***Connecting Farmers to Market*** project which has already launched MF/MI packages to rain-fed farmers: The LDCF2 project will incorporate lessons learned from this project on how to develop flexible payment schedule approaches. Also, the LDCF2 project will also coordinate with other agencies that have significant capacity building experience within the framework of the Connecting Farmers to Market project. For instance, the LDCF2 project will exploit its planned collaboration with the Sudanese Microfinance Development Cooperation (SMDC) to gain expertise in organizing and coordinating steering committees at central and state levels.
- Building on the CBOS's current support for MF: Working with the CBOS offers an opportunity to develop index insurance that can be provided back to back with credit and other microfinance services for farmers and pastoralists in rain-fed areas. By building on the CBOS's existing lending capacities, considerable amounts of subsidized lending for adaptation can be unlocked. Insurance contracts, loan conditions and regulatory frameworks will be re-evaluated through the LDCF2 project.

Output 3.1 In each state at least 1 adaptation options/packages developed to inform and enable the provision of MFI credit packages to stimulate smallholder adaptation and disaster risk reduction including the transfer of adaptation technologies to make crop and livestock production more resilient

Indicative activities include:

3.1.1 Organization, centralization and promotion of lessons learned on best agricultural/pastoral practices via written and video reports and other means/tools (e.g., Farmer Field Schools), workshops and study tours to be incorporated into adaptation plans and required by MFI credit packages

3.1.2 Identification, documentation and promotion of proven adaptation crop and livestock production technology packages through on-farm validation

3.1.3 Assessment of previous experiences, design and development of an effective agro-advisory service to assist MF/MI and ensure the added value of adaptation technologies for risk minimization

3.1.4 Rectify and improve the existing technology transfer programs in the 6 target zones to disseminate proven technology packages to SRFP through their groups/associations/organizations and inform them how micro-finance can be used to support the acquisition of adaptation technologies

3.1.5 Capacity building and institutional for ARC to support targeted adaptation technology development and transfer

3.1.6 Preparation of technical manuals by ARC detailing sustainable agricultural and pastoral activities for year round cultivation and production of milk/meat products to be distributed to rain-fed farmers and pastoralists

3.1.7 Review the Agricultural Bank of Sudan's previous experience with mobile banking and develop an improved mobile banking service to provide microfinance services to rain-fed pastoralists and farmers in the target states

3.1.8 Development of pastoral GPS tracking and mobile-phone based risk advisory services geared towards pastoralists

3.1.9 Capacity building for ARC on crop/livestock-rangeland monitoring, scenario production and Decision Support Systems to be integrated into MF/WII products

3.1.10 Formalization of community-driven adaptation plans into Sudan's next Fiver-Year Plan (2017-2021)

Output 3.2 Legal and regulatory frameworks reviewed, analysed and improved to increase the co-provision of microcredit and micro-insurance services

3.2.1 Assessment of regulatory frameworks that control access of small producers in the rain-fed sector to microfinance services and unification of regulations among partner microfinance providers to enable small holders to access microcredit services for production and marketing on reasonable terms

3.2.2 Obtain LoAs from all involved banks and microfinance institutions to adhere to the improved and unified regulations

3.2.3 Awareness raising for SRFP in the targeted areas on the new regulatory framework intended to facilitate microcredit, insurance and savings services with the adoption of released adaptation technologies, approved by the National Variety, Husbandry, and Pest & Disease Release Committees

3.2.4 Mandating the adoption of proven, climate change adaptation technologies as a prerequisite for obtaining access to credit and micro insurance services

3.2.5 Development of rules and regulations to bundle microfinance and WII

3.2.6 National level coordination, monitoring and evaluation and finance support

Output 3.3 At least three micro-credit, flexible loan products designed and tested to account for pastoral mobility and income cycles of smallholder rain-fed farmers and pastoralists (SRFP). (Each product will specify appropriate loan size, prices, repayment schedules, and eligibility criteria geared toward rain-fed farmers and pastoralists and offered through financial service providers to increase resilience of farming and pastoral practices as prioritised in local adaptation plans)

3.3.1 Design and testing of loan products for adaptation farming and livestock production including integration of flexible payment schedules for farmers and pastoralists dependent on rain-fed practices

3.3.2 Promotion of loan products among the established farmers and pastoralists associations participating in the project

3.3.3 Design a monitoring system for the newly designed loan products and train microfinance provides on the system

3.3.4 Start delivery of the newly designed and tested products to SRFP through microfinance providers utilizing appropriate means for loan delivery

3.3.5 Gender (e.g., youth, women) focused training to inform rain-fed farmers and pastoralists on MF/WII and climate change adaptation technologies

3.3.6 Long-term and periodic monitoring and assessment of adaptation-oriented microfinance performance and improvement of loan products and systems based on annual assessment results

Output 3.4 Organization and capacity development for smallholder rain-fed farmers and pastoralists (SRFP) on newly developed and targeted financial services including training on a financial services management manual

3.4.1 Capacity development for the Agricultural Extension and Technology Transfer Administrations (AETTA) in the targeted localities to organize farmers in groups and associations in the target states

3.4.2 Organization of SRFP in the projected targeted localities where they were not organized to form SRFP associations as per the legal forms available in the each targeted state in order to facilitate access to i) extension services, ii) sustainable, more drought-resilient rain-fed farming technologies (e.g., water harvesting, animal traction, micro-dose fertilizers, early/short maturing plant varieties, seed soaking, inter-row cultivation) iii) pest control services and iv) credit and insurance services

3.4.3 Design of a simple and appropriate financial services management manual for SRFP groups/associations to build their institutional capacities in financial intermediation. The manuals should include membership conditions, credit bylaws, loan products features to be delivered, conditions of access for members, a simple loan recording and accounting systems and delinquency management procedures

3.4.4 Training for Training of Trainers (TOTs) and the relevant staff of (AETTA) in the targeted localities on the agro pastoralist associations' financial services management manual

3.4.5 Capacity development for existing and newly formed SRFP associations on the financial services management manual, including theoretical and on-the-job training which cover establishment of administrative and M&E systems

3.4.6 State level coordination and Monitoring and Evaluation for all 6 states

A summary of the Outcomes, Outputs and the financial resources per Output is provided in Table 5 below.

Table **5**: Summary of Outcomes and Outputs

OUTCOMES	**OUTPUTS**	**COST (USD)**
1. Institutional and technical capacity for climate observation, forecasting and early warning strengthened at national and local levels	1.1 Rainfall modelling and simulations for six target states (River Nile, Gedarif, North Kordofan, and South Darfur, Kassala and White Nile States) to enable local flood forecasts and climate projections	285,000
	1.2 Procurement of 7 climate AWS, 6 synoptic AWS and 162 rain gauges; purchase of high resolution remote sensing data; and capacity reinforcement related to new products/equipment to enhance the availability, quality and transfer of real-time weather/climate data collection on 130,000 ha of drought-prone land for drought early warning	971,000
	1.3 SMA, RSA and MoWRE are trained to provide sustainable services on weather/climate observation, risk analysis, forecasting and early warning including the establishment of a farm information management system and the revitalization of targeted seasonal forecast delivery for rain-fed farmers and pastoralists	210,000
	1.4 Improved communication protocols and mechanisms (i.e. partnership with mobile phone operators) to provide timely and accurate weather and climate risk forecasts to rain-fed farmers and pastoralists in 6 target states	84,000
2. Residual climate risk to	2.1 Comparative analysis and feasibility assessment of different business models for index-based insurance	90,000

rural livelihoods in the states of greatest rainfall variability addressed through parametric insurance products	2.2 At least 6 index based s (e.g., Weather Index Insurance) designed and introduced, covering at least 45,000 farmers and pastoralists who depend on rain-fed farming systems, including the creation of a nationally-based WII marketing and development team	938,000
	2.3 Insurance literacy programme / awareness campaign designed and delivered to small businesses, community-based organisations, local farmers and pastoral communities	605,000
	2.4 Legal and regulatory framework for risk transfer in target states assessed, policy recommendations developed and reinsurance secured	267,000
3: Improved access of vulnerable farmers and pastoralists to financial services for climate change adaptation and disaster risk reduction	3.1 In each state at least 1 adaptation options/packages developed to inform and enable the provision of MFI credit packages to stimulate smallholder adaptation and disaster risk reduction including the transfer of adaptation technologies to make crop and livestock production more resilient	354,100
	3.2 Legal and regulatory frameworks reviewed, analysed and improved to increase the co-provision of microcredit and micro-insurance services	367,100
	3.3 At least three micro-credit, flexible loan products designed and tested to account for pastoral mobility and income cycles of smallholder rain-fed farmers and pastoralists (SRFP) (Each product will specify appropriate loan size, prices, repayment schedules, and eligibility criteria geared toward rain-fed farmers and pastoralists and offered through financial service providers to increase resilience of farming and pastoral practices as prioritised in local adaptation plans)	519,500
	3.4 Organization and capacity development for smallholder rain-fed farmers and pastoralists (SRFP) on newly developed and targeted financial services including training on a financial services management manual	759,500

2.5 Key indicators, risks and assumptions

198. Key indicators, risks and assumptions are indicated in the Project Results Framework and Risk Log in Annex 1. Indicators have been developed to be Specific, Measurable, Achievable, Realistic and Timebound ('SMART') and are indicated in the Project Results Framework. Risks and recommended countermeasures were identified during bilateral consultations during the project preparation phase.

Key risks and mitigation measures underlying project development include the following:

Table 6: Key risks and assumptions

Risk	Level	Mitigation Measure
Targeted farmers and pastoralists are sceptical and unwilling to engage into the index-insurance scheme	High	The project will invest resources in familiarizing the target community with index-insurance that will be designed to yield a benefit that exceeds the cost. The product will also be designed in a way that is affordable to the target community and so that basis risk is low.
Insurance companies are not incentivized and motivated to deal with small holders because parcels are too scattered, too remote and risks are too high (rainfall must be > 300 mm)	Medium	Flexible microfinance products linked with micro-insurance will be developed to target small holder rain-fed farmers and pastoralists. The beneficiaries will be more willing to accept the insurance products because the regulatory framework for compensation criteria will be updated so that compensation can become clear and streamlined.
Limited reinsurance companies willing to back high-risk small holder rain-fed farmers and pastoralists	Low	Experience through the Connect the Farmers to Market (CFM) project has shown that small holder rain-fed farmers can be effectively provided insurance and backed by reinsurance providers. The LDCF2 project will be building a formalized partnership with the CFM project, incorporating their lessons learned, and designing MF-MI products (e.g., WII) which will reduce the risks for insurers due to the mandated adoption of CC adaptation technologies by beneficiaries.
Delay for insurance compensation which could hinder next year harvests	Medium	The micro-insurance policies geared towards farmers and pastoralists will be reviewed and revised so that compensation criteria are clear and compensation is streamlined.
Index insurance and the adoption of creative solutions, such as remotely sensed data-based indices, are likely to be challenging for insurance companies. Consequently, they will not have the experience and knowledge to adapt the product to new crops and data	High	Budget includes significant training for trainers and training for beneficiaries. The budget and workplan also provide ample budget and time to properly design the WII product. Legal and regulatory frameworks will also be adapted to facilitate the development and delivery of WII. Most importantly, feedback from beneficiaries will be facilitated.
High upfront costs in developing WII may not be cost-effective and can lead others towards cheaper traditional forms of micro-insurance	High	In the long-run, index insurance is less expensive to the administrator because there are no on-site inspections or individual loss assessments to perform. (Payout is based on an independent and exogenous weather parameter.) Scaling-up in terms of policy-holders will be supported by first pilot testing the WWI product. Insurance costs become minimized over time through planning of optimal (adaptation oriented) inputs and as yields rise.

The existence of other informal rural credit programmes which provide more flexibility but which are not linked to adaptation	Medium	Informal microfinance is practiced by local merchants and community members. Informal loans are small in quantity and scale because lenders generally receive personal guarantees rather than real collaterals. As such, informal loans are not geared to assist large populations nor to assist in cases of dispute or non-repayment due to the absence of a legal framework. This project will provide the legal and regulatory frameworks to have flexible and tailored loan products and will be able to serve larger populations. Most importantly, lenders are likely to get better returns because the loans will be linked with adaptation technologies.
Limited comprehension of weather/climate information and agricultural advisories	Low	SMA has experience in providing forecasts to the farmers. Extension Services will be used to simplify and translate all messages into simplified and local languages for each target state.
Data sharing is hindered by lack of coordination / willingness of agencies to share data or by technical constraints (e.g., bandwidth issues or local mobile telecommunication networks)	Medium	A cloud-based database will be accessible to all Stakeholders from the information production, dissemination and exploitation sides including SMA, RSA, MoWRE, ARC, M. Ag, M. Livestock, MFIs, Insurance companies, Extension Services, HAC, NGOs
Sudan does not have enough government financing to continue monitoring/research and will not be able to consider recurring O&M/training costs in government budget lines	Medium	By making EWS/CI more useful to various sectors, this pushes the Government to include stable, core budget lines for climate/weather services due to their cross-sectoral importance. Capacity for long-term planning and costing will be built in all information production agencies.
Trained, qualified engineers/technicians leave for more lucrative positions ("brain drain"). Unavailability and limited sustainability of requisite human resources and technical/operational capacities	Medium	Requirements for training as per signed contracts and TORs will be to stay at their respective institute for 2 years (as per Sudanese law) in order to transfer knowledge to others. Also, junior staff will be targeted and training will take place in pairs wherever possible.
Natural disasters damage infrastructure (particularly floods)	High	Robust infrastructure will be procured and training and spare parts will be provided for repair and maintenance in each technical, information production agency.

Uncontrollable risks and assumptions related to internal politics, security and inter-institutional relations include the following:

Table 7: Uncontrollable risks and assumptions

Uncontrollable Risks	Assumptions

Poor co-ordination among implementing and executing agencies	On a national level, the strong government buy-in into the project design is a solid foundation for effective planning and communication and the Institutional Arrangement (TORs) ensures clearly defined roles
Conflict	The first NAPA (LDCF1) project, the ABSUMI and the Connecting the Farmers to Market projects were already implemented in the chosen localities, so there are no foreseen conflicts which might hinder project implementation
Political instability	The Higher Council has demonstrated that it is a stable institution nationally and can withstand changes in governmental regimes / strategies, etc. The LDCF2 project will continue building public awareness among policymakers on climate risks and the benefits of using financial services to support adaptation in order to increase backing for the project.

2.6 Financial modality and Cost-effectiveness

199. In order to implement a cost-effective project, other baseline projects were evaluated to see what relevant activities they are supporting. LDCF funds will be used to leverage partnerships to be created with existing projects to ensure that there is no duplication of activities. Activities within the project ensure that the LDCF2 project will coordinate with other initiatives by building capacities on levels where other projects are not (e.g., Focusing on building EWS capability on the national level rather than regionally (IGAD) and community-based (LDCF1) and improving microfinance services on state levels (CBS is currently working more on the national level)).

200. This project builds on the existing initiatives in terms of equipment acquisitions (building off of the LDCF1 project and the DRR project).To ensure cost-effectiveness for Outcome 1, it was critical to evaluate the equipment purchases. An assessment of existing equipment was made, noting the manufacturer, whether it is still working and whether the NHMS has an interest in continuing with particular makes/models. The NHMS weighed current costs against the costs of potentially cheaper solutions and the added costs of training personnel. They also weighed the option on the use of manual and/or automatic stations. Due to previous experiences in deploying and operating AWS, the Sudan Meteorological Authority opted to purchase a mix of automatic and manual stations. As training for AWS is intensive, it was deemed important for the cost estimates to include accurate training and operation and maintenance costs. Fifteen percent (15%) of the running costs were designated for spare parts.

201. A key design component was to try to consolidate the training programs and workshops. A coherent training programme was emphasized where one activity can cost effectively satisfy more than one of the needs identified, such as group training on-the-farm or for the Training of Trainers. Also, other baseline programs involving capacity building for the DRM, HAC, were evaluated in order to ensure that money has been spent wisely.

202. Due to project budget limitations, it was necessary to select from the long-list of equipment / capacity building needs and identify those within the scope and cost-effectiveness of this project. The chosen set of Outputs was reviewed in a validation workshop involving all stakeholders and the multi-stakeholder EWS focus group committee meeting. Based on group consensus, Outputs were revised accordingly. The Outputs outlined have been chosen based on their financial feasibility. They have been chosen over alternative ways to address project barriers as shown in Table 8.

Table 8: Demonstration of Cost-effectiveness for each proposed Output indicating the project barrier addressed

OUTPUTS	Barrier Addressed	**Alternatives Considered**
1.1 Rainfall modelling and simulations for six target states (River Nile, Gedarif, North Kordofan, and South Darfur, Kassala and White Nile States) to enable local flood forecasts and climate projections	Insufficient coverage of weather, climate and hydrological monitoring infrastructure	**Alternative 1:** Expand the hydrological monitoring network based on a cross-border watershed approach; however, this requires cross-border data sharing and more financial resources. This project lays a foundation for future initiatives to model hydrology for rain-fed farmers by establishing good monitoring networks in 6 target states. **Alternative 2:** Different equipment manufacturers can be used. However, SMA, MoWRE and RSA have experience with the current models. Using different models will increase the training and maintenance costs according to Stakeholder discussions.
1.2 Procurement of 7 climate AWS, 6 synoptic AWS and 162 rain gauges; purchase of high resolution remote sensing data; and capacity reinforcement related to new products/equipment to enhance the availability, quality and transfer of real-time weather/climate data collection on 130,000 ha of drought-prone land for drought early warning	Insufficient coverage of weather, climate and hydrological monitoring infrastructure	**Alternative 1:** Only use manual stations and incorporate SMS communication services: For forecasting and early warnings in Sudan, it is more cost-effective to use automatic weather stations (AWSs) because SMA has existing expertise in working with AWSs and using AWSs reduces the need to pay and train manual observers. Procuring only manual stations supports untimely manual reporting procedures at each station (e.g., data transmission each month). **Alternative 2:** Use stations with cheaper sensors to decrease the cost of spare parts: If sensors do not adhere to WMO standards, WMO will not consider the station data in regional and global models. As a result, the country's data would not be assimilated to improve the regional and international forecasting models the country will exploit and downscale. **Alternative 3:** Use outside satellite viewing products for free: this option will be considered where regional and international databases (e.g., FEWSNET and NOAA's CFS tools) will be exploited to support Sudan to assimilate data into national forecasting. However, satellite data is difficult to interpret real-time without significant experience. As a result, such free satellite visualization tools are planned to validate forecasts or be used in climate change projections. Also, free satellite products do not offer high enough resolutions to support claim validation. **Alternative 4:** Acquiring more equipment to improve national coverage: This project is focusing on capacity development for service delivery rather than excessive procurement. Good and targeted service delivery of WII products informed by accurate weather/climate information is more likely to ensure the sustainability of continued monitoring and the use of such information to support climate risk finance.
1.3 SMA, RSA and	Poor long-term sustainability of	**Alternative 1:** Use outside forecasting products for free: this option will be considered, such as NOAA's CFS forecasting tool which is readily available and free, however, these

OUTPUTS	Barrier Addressed	Alternatives Considered
MoWRE are trained to provide sustainable services on weather/climate observation, risk analysis, forecasting and early warning including the establishment of a farm information management system and the revitalization of targeted seasonal forecast delivery for rain-fed farmers and pastoralists	observational infrastructure and technically skilled human resources	products must be downscaled and calibrated with in situ data. Therefore, regional and international databases (e.g., FEWSNET and NOAA's CFS tools) will be exploited to support Sudan to develop national forecasting by translating open-source climate monitoring and forecasts into flooding and drought/food security information. **Alternative 2:** SADIS ($50,000) is a satellite data distribution system. The system works well, but forecasters must build enough qualifications to use the system, so capacity building costs are too high to consider this a cost-effective option. **Alternative 3**: One-time training to save financial resources: This project will procure, in a staggered manner, a rational amount of stations considering human resource constraints so that the new stations can be well-integrated with existing NHMS and there are no continuity breaks in monitoring (i.e., problem if all resources are focused on procurement and existing stations are neglected). Budget has therefore been allotted to provide training each year as more personnel are absorbed and more equipment is procured. **Alternative 4:** All operation and maintenance can be outsourced to a private company through a PPP (public private partnership) to enable the company time to train information production personnel over a longer period of time. However, SMA and MoWRE already have experience with learning-by-doing and has received training for many of the specific monitoring instruments they have requested to be acquired.
1.4 Improved communication protocols and mechanisms (i.e. partnership with mobile phone operators) to provide timely and accurate weather and climate risk forecasts to rain-fed farmers and pastoralists in 6 target states	Challenges in producing tailored weather/climate information and agricultural advisories Challenges with cross sectorial data sharing and institutional collaboration	**Alternative 1**: Have separate data portals for each agency to ensure security: however, this would prohibit the easy use of data across agencies and with the extension services (See Figure 1) **Alternative 2:** Do nothing, if seasonal forecasts and early warnings are not communicated properly, alerts and forecasts will not be used to build SRFP resilience. Also, users will continue to lack confidence in alerts if the uncertainty of forecasts is not conveyed to the general public. A public awareness campaign by extension services and NGOs/CSOS is planned to inform SRFP about the utility of agricultural advisories and forecasts to help them build resilience to climate extremes.
2.1 Comparative analysis and feasibility assessment of different business models for index-based insurance	Long approval and complicated compensation process for existing insurance products No experience with	**Alternative 1**: Rely on existing business models to create WII products; Insurance scheme viability must be tested in the field to fully understand value chains, uses of inputs, main risks and how to link credit with insurance in order to develop realistic premiums.

OUTPUTS	Barrier Addressed	Alternatives Considered
	Weather Index Insurance products	
2.2 At least 6 index based insurance products (e.g., Weather Index Insurance) designed and introduced, covering at least 45,000 farmers and pastoralists who depend on rain-fed farming systems, including the creation of a nationally-based WII marketing and development team	Long approval and complicated compensation process for existing insurance products No experience with Weather Index Insurance products	**Alternative 1**: Use existing classical insurance products for agriculture which are cheaper in the short time: In the long-run, index insurance is less expensive to the administrator because there are no on-site inspections or individual loss assessments to perform. (Pay-out is based on an independent and exogenous weather parameter.) Also, insurance costs become minimized over time through planning of optimal (adaptation oriented) inputs and as yields rise. Most importantly, because the index is quantifiable (e.g., surpassing a threshold) and not subject to the impartiality of claims adjustors, compensation criteria are clear. **Alternative 2:** Outsource WII product development to a private company. However, little national capacity will be built so as to get feedback from end-users and be able to adapt the models as more data becomes available. Furthermore, adjusting compensation schemes based on new types of data (e.g., higher resolution satellite data) will not be possible unless outside expertise is recruited to train a nationally-based WII development team.
2.3 Insurance literacy programme / awareness campaign designed and delivered to small businesses, community-based organisations, local farmers and pastoral communities	Long approval and complicated compensation process for existing insurance products No experience with Weather Index Insurance products	**Alternative 1:** Use existing insurance literacy among SRFP: Stakeholder consultations indicated that SRFP do not take out insurance plans because the approval process is long and the compensation process is not understood: Because WII is new to Sudan, ample budget and time must be provided to train insurance agents on the WII product and to obtain feedback from rain-fed farmers and pastoralists on their needs. The project will invest resources in familiarizing the target community with index-insurance such that it will be designed in a way that is affordable and understandable for the target community.
2.4 Legal and regulatory framework for risk transfer in target states assessed, policy recommendations developed and reinsurance secured	Long approval and complicated compensation process for existing insurance products No experience with Weather Index Insurance products	**Alternative 1:** Rely on existing legal and regulatory frameworks; however these frameworks are not adapted to facilitate the development and delivery of WII. Moreover, beneficiaries will be more willing to accept the new insurance products if the regulatory framework is revised so that compensation can become clear and streamlined.
3.1 In each state at least 1 adaptation options/packages developed to inform and	Lack of customized and understandable microfinance services	**Alternative 1**: Existing case is not offering adaptation technologies/practices with MF (0 USD) which will not provide a means for the SRFP to have sustainable farming/pastoral practices and can contribute to mal-adaptation practices. There are also numerous ready,

OUTPUTS	Barrier Addressed	Alternatives Considered
enable the provision of MFI credit packages to stimulate smallholder adaptation and disaster risk reduction including the transfer of adaptation technologies to make crop and livestock production more resilient	for rural clients	proven climate change adaptation technologies developed by the Agricultural Research Corporation which can easily be adopted by rain-fed farmers/pastoralists, including women and children to help them build more resilient practices.
3.2 Legal and regulatory frameworks reviewed, analysed and improved to increase the co-provision of microcredit and micro-insurance services	Lack of customized and understandable microfinance services for rural clients	**Alternative 1:** Rely on existing legal and regulatory frameworks; however these frameworks are not adapted to facilitate the development and delivery of MF geared towards SRFPs. Moreover, beneficiaries will be more willing to accept the new MF products if the regulatory frameworks are revised so that payment schedules are more flexible and adaptation technologies offered with the MF products are more geared towards specific SRFP livelihood needs.
3.3 At least three micro-credit, flexible loan products designed and tested to account for pastoral mobility and income cycles of smallholder rainfed farmers and pastoralists (SRFP) (Each product will specify appropriate loan size, prices, repayment schedules, and eligibility criteria geared toward rain-fed farmers and pastoralists and offered through financial service providers to increase resilience of farming and pastoral practices as prioritised in local adaptation plans)	Lack of customized and understandable microfinance services for rural clients	**Alternative 1:** Offering classical MF (Additional cost 0 USD) rather than targeted MF products will not enable the rural population at poverty level who have little assets or farming skills to repay their loans. By linking these loans with adaptation technologies, they will build resilient farming and pastoral practices. Furthermore, if products are not developed with flexible payment schedules based on seasonal cultivation or pastoral markets, SRFP will be unable to repay their debts and lose confidence in new products, Consequently, SRFP will likely resort to informal lenders. However, informal loans are not geared to assist large populations and without a legal framework, cases of dispute and non-repayment are often neglected.
3.4 Organization and capacity development for smallholder rain-fed farmers	Lack of customized and understandable microfinance services	**Alternative 1:** Promote individual loans for SRFPs; however, there will be a much greater chance that the MF products will not be successfully used due to an insufficient collective asset base. As SRFP are new to financial concepts, individual loans will not

OUTPUTS	Barrier Addressed	Alternatives Considered
and pastoralists (SRFP) on newly developed and targeted financial services including training on a financial services management manual	for rural clients	provide a necessary safety net to enable group training. The net loss equivalent to the cost of MF product development will be much greater than the relatively small investment required to organize and train the smallholder rain-fed farmers and pastoralists when SRFP are organized. They can be more easily guided by experienced extension officers and it becomes easier to build financial literacy and sustainable agro-pastoral practices.

2.7 Sustainability of the project

203. This project represents an effort to upscale priorities identified in Sudan's NAPA to 6 states and at the national scale coordinating with all existing EWS/adaptation-related and MF/insurance initiatives. The project is in-line with the Government's strategy to develop and expand microfinance services to the rural poor and will build upon initiatives where the Central Bank of Sudan has earmarked funds to support MF programmes. The project furthermore supports the MDGs in terms of aiming to reduce poverty reduction by enabling the rural populations (for which more than half are in poverty) to i) take preventive actions when weather or climate-induced risks are forecasted and ii) have access to financial services to facilitate risk reduction.

204. The project makes the maximum use of LDCF funds by working in established LDCF1 zones where adaptation technologies have already been successfully implemented. It is thus a strategic next step to the first NAPA project by piloting new insurance and microfinance services where they are likely to succeed. Furthermore, the project will implement the new Weather Index Insurance products (WII) in States where the Connecting the Farmers to Market and ABSUMI projects have built the financial literacy of farmers.

205. Furthermore, successful strategies from the LDCF1 project based on the mid-term evaluation will be duplicated here to ensure sustainability. Former measures which will be adapted include:

i. Using Technical Committees for project management on State levels.

ii. Piloting the successful farming/pastoral adaptation technologies which worked in the LDCF1 States in the additional LDCF2 States when similar climate and livelihood conditions exist.

206. Most significantly, LDCF funds will be used to increase the involvement of the private sector in the development of MF/WII products. Benefits of this approach are two-fold: Firstly, private sector funding supporting the expansion, operation and maintenance of weather/climate observation infrastructure will ensure lower basis risk (i.e., pay-outs are more likely to match actual losses). Secondly, early warning and seasonal forecasts can be improved as a result of more extensive and reliable monitoring networks. Additionally, it will be more likely that extreme weather and climate monitoring will continue through the support of the private sector. Furthermore, by reinforcing the capacities of the banks and insurance companies to have better outreach, they will be able to support targeted financial services for SRFP which maximize benefits and reduce risks in the long-term.

207. Various activities support the project's sustainability after the support of the LDCF2 project ends including:

- Staggered approach to equipment procurement, training and WII product development/training;
- Integrated approach to risk management by mandating the adoption of adaptation technologies with financial services;
- Station placement based on meetings with local representatives and the insurance sector;
- Development of Standard Operating Procedures (SOPs) for equipment operation and maintenance and data storage and collection;
- Knowledge sharing with international and regional training centers and with South-South cooperation (e.g., study tour in another developing Islamic country, which has successfully adopted WII);
- Development of an open-access data portal to share weather/climate/agricultural data with all relevant Stakeholders including Farmer/Pastoral Unions, select NGOs/CBOs and MFIs/insurance companies;

- Building capacity for local focal points and NGO/CBO representatives at the village level to better understand how MF/insurance products and adaptation technologies can help alleviate climate risks;
- Training and capacity building strategies for multiple civil servants so that expertise stays within institutions even if personnel leave;
- Capacity building to incorporate recurring costs into government budget lines;
- Collaboration between ministries SMA, RSA, MOWRE and MOAI to ensure forecast bulletin or alert information is provided in useful quantitative units (e.g., crop yield, area of flood plain, wind velocity) for various socio-economic sectors (e.g., agriculture, insurance) and the rural populations who are most vulnerable;
- Leverage of revenue-generating weather/climate/agricultural advisories to ensure cost-recovery;
- Creating multiple complementary MF/insurance products so that the various cultivation/livestock value chain needs within the different states can be addressed;

208. Overall, the main factors affecting the financial sustainability of the project beyond the duration of the LDCF grant include the ability of insurance companies to understand and be able to adapt the new WII products, the ability of information production institutions to develop cost-recovery mechanisms to continue climate/weather monitoring, the potential lack of coordination with MF/MI/DRM initiatives which can waste financial resources, and a lack of a Monitoring and Evaluation mechanism to track lessons learned for scaling-up the pilot MF and WII products. Project design has included Outputs/Activities to address these risks as indicated below:

- Activity 2.3.3 - Development of a nationally based WII marketing and development team associated with the WII international specialist organization
- Activity 1.3.4 - Capacity reinforcement for SMA, RSA and MOWRE by a National financial expert on establishing sustainable cost-recovery mechanisms and long-term budgets with revenues generated from selling tailored weather/climate products and risk maps
- Activity 1.3.2 - Formalized coordination with the UNDP DRR project National Early Warning Committee
- Activity 2.2.6 - Development of partnerships with projects which can facilitate the link between micro-finance and micro-insurance and savings (e.g., ABSUMI project) including creation of a formalized collaboration with the Farmers to Market Program
- Activity 3.3.7 - Long-term and periodic monitoring and assessment of adaptation-oriented microfinance performance and improvement of loan products and systems based on annual assessment results
- Activity 3.2.6 - National level coordination, monitoring and evaluation and finance support
- Activity 3.4.6 - State level coordination and Monitoring and Evaluation for all 6 states

2.8 Project replicability

209. In order to ensure project replicability, this project has focused on updating regulatory and legal frameworks so as to support the development of new MF and WII products and be able to upscale/improve them. Any activity or improvement to an activity will thereby be able to be replicated because the core framework for financial service provision will be developed and tested in this project.

210. The WII products will be designed to serve multiple agendas by focusing on regions and associated communities prioritized by national policy strategies who are considered most vulnerable in terms of high poverty rates and at high risk to rainfall variability. At the same time, as former projects have demonstrated (e.g., ABSUMI and Connecting Farmers to Market), these regions have great potential for scaling up microfinance and insurance schemes. Furthermore, even though WII is a private sector product, it will be developed by securing public investment and creating essential enabling conditions – legal base, technical capacity and awareness – for a successful start-up and scaling up.

211. The project has also focused on building on the LDCF1 project and the ABSUMI and Farmers to Market projects so that new products can be piloted in regions where financial literacy and adaptation awareness has already been built. This will increase the likelihood that the new MF and WII products will succeed and can be scaled-up.

212. The project has also considered that the needs for capacity building (both equipment and human resources) are too great to cover each of the 6 states and on the national level entirely. As a result, the new climate/weather monitoring capabilities will be tested in the most vulnerable agro-ecological zones where the first NAPA LDCF1 project was developed. Lessons learned from LDCF1 project in terms of successful adaptation technologies for rain-fed farmers and pastoralists will continue to be built upon with the LDCF2 project. The LDCF2 project will further build on the resilience of rain-fed farmers and pastoralists in the LDCF1 zones by providing them weather/climate alerts/information and agricultural advisories as well as facilitating their access to financial services in the form of newly tailored microfinance and Weather Index Insurance (WII) products. For instance, market research conducted under this project will support the development of a mobile-phone based platform for weather/climate/agricultural advisories which can easily be extended as public awareness on the utility of advisories and warnings is heightened.

213. Furthermore, as WII is a new concept in Sudan, specific attention has been given to the current limitations of national agencies to test and adapt new WII products. The LDCF2 project will enable insurance companies to gain the experience and knowledge to adapt WII to new crops and data because they will be implicated in the design. The project includes the development of a nationally based WII product development team who will be able to facilitate insurance outreach and improvements to WII products. Ample budget and time to obtain feedback from rain-fed farmers and pastoralists have been allotted so that the products can be improved.

214. The project also supports various mechanisms of knowledge transfer including on-the-farm training, support for Farmer Field Schools and training for Agricultural Extension and Technology Transfer Administrations (AETTA). The idea is to build capacity within institutions on national and state levels so that they become more self-sufficient and less reliant on outside experts. The learning-by-doing approach will be reinforced on local, regional and international levels. For example, links with international (e.g., MM5, UN-SPIDER) and with regional centres (ENTRO, UNDP's EWS-Africa headquarters in Ethiopia) will help build national forecasting expertise. Expertise can be easily transferred to new personnel because civil servants receiving training will be required to transfer knowledge as per TORs.

215. Training recipients and types of training are outlined below:

- SMA/RSA/MoWRE technicians/engineers on operation and maintenance;
- SMA/RSA/MoWRE forecasters on national, regional and international forecasting tools;
- MoWRE/RSA on hydrological modelling;
- RSA on high-resolution satellite data treatment and risk mapping;
- Training for information producers on how to develop a suite of revenue-generating tailored climate products (including developing mobile-phone advisories) and how to plan for long-term budgeting;

- Training for SMA/RSA/MoWRE/ARC/HAC/MFIs/Insurance Companies/Extension Service and Farmer/Pastoral Trade Union Representatives on Cloud data sharing;
- Insurance company/agent, Training of Trainers training on WII products and manuals;
- MFI/SMA, Training of Trainers and Agricultural Extension and Technology Transfer Administrations (AETTA) training on new MF products geared towards SRFPs, including organization of SRFPs;
- Training for ARC/MFIs and insurance companies on GPS pastoral tracking and mobile unit financial service outreach technologies;
- Training and public awareness for SRFPs (village level beneficiaries) on WII, adaptation technologies, available weather/climate/agricultural advisories and microfinance services.

216. It should be emphasized that the pilot programs to test WII and MF products have been developed to be easily scaled-up and modified to serve other rural populations faced with climate risks. High upfront costs in developing WII will be minimized over time because administrator fees to perform individual loss assessments are not required with index insurance. Also, insurance and lending costs decrease as adaptation-oriented inputs are adopted enabling yields to rise and the ability of SRFP to repay loans. Scaling-up in terms of policy-holders will occur as the products become cheaper, efficient value chains are established and insurance agencies gain experience in piloting and testing WII products.

2.9 Stakeholder involvement

2.9.1 Stakeholder baseline analysis

217. 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 supporting weather/climate monitoring, microfinance, insurance and adaptation technologies for rain-fed farmers and pastoralists. Consultations have ensured the proposed project is grounded in local realities whilst being aligned to national policy.

218. The following Table 9 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 Consultations – Target populations in all 6 states were consulted and informed about EWS and WII during July 2013. Between 20 and 30 locally-based Stakeholders, including women, were present at each meeting. They responded to questions providing evidence on the needs for forecasting, early warning and financial services (See MicroEnsure report Annex 8 Section 5.5). Meetings were also held with Director Generals of the State Ministries of Agriculture in the 6 states. Subsequently, on the 11th September 2013, a Validation meeting among approximately 60 Stakeholders from state and national levels was held in Khartoum. The Validation meeting served as a venue to agree upon project outputs, risk, partnerships and indicators.

Involvement in Baseline Assessment – consulted during project development

Role Identification – involved in identifying institutional arrangement partners

Risk/Barrier Analysis – consulted on their specific institutional risks or barriers

Policy/ Strategic alignment to priorities – institution has policies/strategies which are aligned with project

Co-financing Identification – other projects to support and be supported by the 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

Document Endorsement – signatures obtained from government and UNDP Country Office

219. Furthermore, Sudanese women, just as women in general, have been considered in project development and will continue to be implicated in project implementation. Women are an important target group because they are more dependent on natural resources for their livelihoods. Climate change has a strong impact on the expected women beneficiaries who are living in rural regions and have limited mobility. In addition, women 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 (Buhl 2005; Eriksen et al. 2005, Eriksen et al. 2007). This inequality is compounded by a lack of opportunities arising from limited access to education and information services which prohibit participation in decision-making. Due to all of these reasons, this project is targeting women as potential beneficiaries of MF loans and gender-specific technologies.

220. Specifically, the LDCF2 project will focus on further organization of women groups to facilitate access to micro-finance, savings and insurance services in the 6 states. The ABSUMI project provided great evidence that economically-active, poor rural Sudanese women are excellent candidates for micro-financial services.

221. Furthermore, the Agricultural Research Corporation has developed certain adaptation technologies targeted to women. These technologies enable women to improve their cultivation / livestock husbandry and feeding practices. The LDCF2 project will exploit and pilot these technologies in order to build the resilience of women in the rain-fed regions of Sudan.

222. In some Sudanese States, there is also good evidence that women are decision-makers at the village level (In South Darfur and North Kordofan States there is a large number of women headed households. However, it is also well known that women contributions in the River Nile state are generally minimal. On the State level, however, the LDCF1 project demonstrated that women are much less implicated as decision-makers. To resolve this issue, the Technical Committees to be created to manage the project on State levels (See Section 5 Management Arrangements) will each have a female representative to promote gender awareness and gender assessments.

Table 9: Stakeholder Involvement Matrix

Stakeholder	Inception Consultations	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 of Environment and Forestry	X	X	X	X	X			X	
Higher Council for Environment and Natural Resources (HCENR)	X	X	X	X	X	X	X	X	X
Humanitarian Aid Commission (HAC)		X		X	X			X	
Office for Coordination of Humanitarian Affairs (OCHA)	X			X	X		X		
Sudan Meteorological Authority (SMA)	X	X	X	X	X	X		X	
Remote Sensing Authority (RSA)	X	X	X	X	X			X	
Agricultural Research Corporation (ARC)	X	X	X	X	X		X	X	
Ministry of Agriculture and Irrigation	X	X	X	X	X			X	
Ministry of the Interior (Civil Defence & HAC)	X	X	X	X	X			X	
Ministry of Animal Resources	X	X	X	X	X			X	

Central Bank of Sudan	X	X	X	X	X		X		
Agricultural Bank of Sudan	X	X	X	X	X	X		X	
Savings and Social Development Bank (SSDB)	X	X	X	X	X			X	
The Farmers Commercial Bank	X			X				X	
The Sudanese Rural Development Company	X			X				X	
Kassala State Social Development Fund	X			X				X	
Sheikan Insurance Comany	X			X				X	
Cooperative Insurance Company	X			X				X	
The Farmers Commercial Bank	X			X				X	
Technical Research Institutions / Universities									
Sudanese Environmental Conservation Society	X		X						
Sudanese Meteorological Society	X		X						
State universities	X						X		
Private Sector									
Mobile phone company	X	X		X		X		X	
Sudanese Microfinance Development Corp.	X	X	X	X		X		X	
Sheikan Insurance Comany	X			X		X		X	

Regional/ Sector									
• Gedarif State • Gedarif State Social Development Fund (SDF)	X	X	X	X		X		X	
• South Darfur State • South Darfur State SDF	X	X	X	X		X		X	
• River Nile State • River Nile State SDF	X	X	X	X		X		X	
• White Nile State • White Nile SDF	X	X	X	X		X		X	
• Northern Kordofan • N. Kordofan SDF	X	X	X	X		X		X	
• Kassala • Kassala SDF	X	X	X	X		X		X	
NGOs/CBOs/CSOs									
Farmer's Trade Union in each State	X	X	X	X				X	
Pastoralist's Trade Union in each State	X	X	X	X				X	
Practical Action	X	X	X				X	X	
Youth/Women Society Organizations (Ahfad University, Women's Union of Kassala, Sudanese Youth Union)	X	X	X	X			X	X	
Sudanese Climate Change Network	X	X	X				X	X	

MASAR (pastoralist NGO)	X	X	X				X	X	
Nafeer Initiative	X	X	X	X			X		
OXFAM	X								
Donor Partners									
UNEP	X	X				X	X	X	
World Bank									
CIDC	X							X	
European Commission									
WFP	X	X						X	
IRDC	X							X	
US AID	X								
FAO	X							X	
IFAD	X							X	

2.9.2 Stakeholder involvement plan

223. The Stakeholders identified during project preparation will continue to be implicated in project implementation. A Stakeholder involvement plan has been created to provide a framework to guide interaction between implementing partners and the key stakeholders, particularly end-users to validate project progress. All Stakeholders involved in the baseline self-capacity assessment will be addressed again in order to track the efficacy of Stakeholder capacity building both operationally and technically. Also, the women's university, Ahfad University which is associated with and houses women-focused NGOs, will continue to be implicated and consulted in order to ensure women are properly engaged/warned. Gender-focused NGOs/CSOs will have the role of conducting gender disaggregated surveys indicating their receipt of alerts and the adoption of financial services by women as per the Project Results Framework. Women groups established by and partnered with MFIs in addition to women agricultures associations who have been exposed to Training of Trainers programs in different areas will continue to be consulted. Details of the Stakeholder Involvement Plan are indicated in Annex 6.

2.9.3 Expected Benefits

224. The project will have significant adaptation and associated socio-economic benefits. This will be achieved by introduction of sustainable risk finance products (index based insurance) that will support lending to small-scale rain-fed agro-pastoral communities. As a result of the project intervention, farmers and pastoralists will be able to use insurance to safeguard investments that will increase their productivity as well as long term resilience to climate change. At least 45,000 people will directly benefit from this risk finance scheme. The scheme, combined and delivered with micro-credit options will help the most vulnerable SRFP build wealth and acquire assets necessary to enable them to diversify livelihoods and better absorb climatic shocks.

225. Index insurance is appropriate in Sudan, particularly in the target regions because extreme weather is one of the major risks confronting SRFP households and has caused them to rely on slowly-released and unreliable humanitarian aid. The severity and frequency of droughts and floods is predicted to increase (See Sudan's Second National Communication), thereby incentivizing resilience building and the adoption of adaptive measures for farming/pastoral production systems. By combining credit provision with the delivery of adaptation services under the component 3, the project will turn local micro-finance institutions into the actual delivery channels for adaptation financing at the sub-national and local levels.

226. In order for this scheme to operate sustainably and maintain delivered benefits in the long run, the project, as described above, takes a capacity development and participatory approach. As such, under component 1, observation and forecasting capacity will be strengthened to improve accuracy and timeliness of climate data which is essential for any index-insurance scheme. Delivery of essential equipment and technical skills through a series of targeted trainings will improve the ability of the key institutions such as the Sudan Meteorological Authority and the Remote Sensing Authority to provide seasonal and long term forecasts as well as early warning services to vulnerable SRFP. Under component 2, a series of financial literacy training courses will build the trust and confidence in WII. The index-insurance products will be developed with a direct and active participation of the communities along with the banks, public/private insurance companies, and government authorities. Similarly, micro-finance institutions will also be supported to deliver micro-finance products that respond to local adaptation priorities captured in community consultations through component 3.

227. Benefits to the project also include updates to the regulatory frameworks for reinsurance and co-provision of micro-insurance and micro-credit to facilitate the development of climate risk transfer products along with their integration with MF products that target farmers and pastoralists.

228. The largest economic benefits are expected from building capacity of the climate/environmental information production agencies to tailor climate products to the needs of private insurance companies. Together with satellite imagery used for land-use planning and monitoring, tailored climate products and early warnings will also provide significant local environmental benefits, such as detailing best water management practices which is crucial to help Sudan's fight against desertification. At the local level, early warnings and climate hazard mapping can provide economic benefits by reducing losses of agricultural produce, infrastructure (roads and bridges) and disruption to people's livelihoods.

229. Communities will also immediately benefit from the Standard Operating Procedure to be implemented for alert communication. The total population benefiting from these developments has the potential to grow hugely if warnings extend to a reasonable percentage of the total population e.g. through a mobile phone relay. Also, the feedback mechanism can enable the communication mechanism to be improved via end-user comments/suggestions.

230. Many of the beneficiaries will be women, especially within the agriculture sector who do not have access to information, yet are most vulnerable to food insecurity and climate change due to their dependence on natural resources for subsistence household chores and their limited access to education and information services which prohibit participation in decision-making. The project will encourage female members of farmers and pastoralists to engage in MF because experience from the ABSUMI project shows women are diligent in repayment and have high a degree of financial discipline.

231. The UNDP Environmental and Social Screening template has also been applied to ensure environmental and social safeguards are in place. According to this checklist, the project is considered Category 2 where no further safeguards must be incorporated because no environmental or social risks are foreseen (See Annex 10).

232. Environmental safeguards being applied to the LDCF2 project include the following:

- Tailoring EWS/CI and agricultural advisories to support more climate resilient rain-fed farming and livestock practices
- Linking environmentally-friendly adaptation technologies (e.g., equipment/practices which decrease erosion and limit degradation) with financial services

233. Social safeguards being applied include the following:

- Facilitating access to financial services for the most vulnerable (women prioritized)
- Enabling smallholder rain-fed farmers and pastoralists to mitigate climate risks through access to insurance coverage
- Consulting villages with the Met Service and insurance companies to find the best station/equipment placement which benefits the most vulnerable
- Adopting adaptation technologies based on gender (women/youth/illiterate etc)
- Facilitating feedback from marginalized populations on the utility of weather/climate advisories, adaptation technologies and financial services

3 PROJECT RESULTS FRAMEWORK

This project will contribute to achieving the following Country Programme Outcome as defined in CPAP:

CPAP FOCUS AREA 1 OUTPUT 2: Equitable livelihoods initiatives for rural and urban communities are supported for recovery and development

CPAP FOCUS AREA 2 OUTPUT 1: Vulnerable communities to climate change and climatic risks adapted comprehensive sets of adaptation measures

CPAP Focus AREA 2 OUTPUT 3: Environmental governance policies and regulatory frameworks for enabling better natural resources and risk management developed

Country Programme Outcome Indicators:

UNDAF OUTCOME 1 INDICATOR 2: Number of private sector companies and microfinance institutions providing microfinance services

UNDAF OUTCOME 2 INDICATOR 2: Number of vulnerable, especially female headed, households adopting climate change adaptation measures

UNDAF OUTCOME 2 INDICATOR 4: Number of states with functioning early warning systems, including flood and drought preparedness systems

Primary Applicable Key Environment and Sustainable Development Key Result Area (same as that on the cover page, circle one): Promote climate change adaptation

Applicable GEF Strategic Objective and Program:

OBJECTIVE 2: Increase adaptive capacity to respond to the impacts of climate change, including variability, at local, national, regional and global level

Applicable GEF Expected Outcomes:

Outcome 2.1: Increased knowledge and understanding of climate variability and change-induced risks at country level and in targeted vulnerable areas
Outcome 2.2: Strengthened adaptive capacity to reduce risks to climate-induced economic losses

Applicable GEF Outcome Indicators:

- Relevant risk information disseminated to stakeholders
- Type and no. monitoring systems in place
- % of population covered by climate change risk measures

	Indicator	Baseline	Targets End of Project	Source of verification	Risks and Assumptions
Project Objective[27] To increase climate resilience of rain-fed farmer and pastoral communities in regions of high rainfall variability through climate risk financing	1.Number of small-holder rain-fed farmers and pastoralist households with access to MF or MF/WII products 2.Domestic finance committed to the relevant institutions to monitor extreme weather and climate change	1. MFIs/Insurance companies have limited capacity to provide tailored financial services for smallholder rain-fed farmers and pastoralists. Current products are too generalized and do not consider flexible payment cycles and reasonable compensation criteria. MFIs/Insurance companies have not found means to access the remote, rural areas (e.g., mobile units), organize the farmers/pastoralists nor mitigate their associated risks. As a result, it is common that farmers/pastoralists use informal lending services. BASELINE:93,500 with access to MF,	1. TARGET 138,500 small-holder rain-fed farmers and pastoralists (SRFP) with access to MF and 45,000 SRFP with access to MF/WII 2. TARGET: 30% increase in domestic financing for equipment/product operation and maintenance across all institutions (SMA, RSA, MoWRE, ARC)	1. Capacity assessment scores 2. Ministry budget lines for recurring costs	RISK 1 Sudan does not have enough government financing to continue monitoring/research and will not be able to consider recurring O&M/training costs in government budget lines ASSUMPTION 1 Capacity for long-term planning and costing will be built in all information production agencies ASSUMPTION 2 There is sufficient political support

[27] *Objective (Atlas output) monitored quarterly ERBM and annually in APR/PIR*

		0 with access to MF/WII; 2.Existing budget plans do not have sufficient funds to maintain and operate environmental monitoring infrastructure. BASELINE: Annual O&M budgets for weather and climate monitoring institutions are approximately, MoWRE: USD 223,000, RSA: USD 100,000 and SMA: 300,000.			and will within the relevant institutions to reinforce existing capacities for successful execution and implementation of the project.

	Indicator	Baseline	Targets End of Project	Source of verification	Risks and Assumptions
Outcome 1[28] Institutional and technical capacity for climate observation, forecasting and early warning strengthened at national and local levels	1.% increase in coverage for climate/weather monitoring in each of the 6 target states BASELINE: On average1-3 weather stations and 30 rain gauges are located in each target state 2.% of rain-fed farmers and pastoralists with access to improved weather/climate information and early warnings (disaggregated by gender). 3.Frequency of forecast bulletins	1.Currently, weather and climate monitoring coverage in the target States is limited. Most equipment is manual and up to 40% of equipment is not-functional. A BASELINE of what is operational includes in the 6 target States includes the following: Meteorological stations: 28 manual, 32 automatic Hydrology equipment: 17 water level, 4 manual and 1 automatic flow meters Rain gauges: 98 manual 2.There are existing regional and community-based EWS initiatives for food security, however, a national alert system concerned with extreme hydro-meteorological	1. TARGET: Meteorological stations: 13 additional automatic weather stations Hydrology equipment: An additional 8 water level, 3 manual and 2 automatic flow meters Rain gauges: An additional 162 manual rain gauges 2. 50 % increase in population who have access to improved EWS/CI TARGET: % Women who receive EWS alerts/CI in target states: 8% % Men who receive	1.Review of budget spent on equipment procurement and rehabilitation and data held on servers to show that new equipment is operational 2. a) Gender disaggregated survey on receipt of alerts b) Record of debriefings by HAC post extreme weather events c) HAC/SMA record of end-user feedback 3. SMA forecast and bulletin archives	RISK 3 Limited comprehension of weather/climate information and agricultural advisories ASSUMPTION 3 SMA has experience in providing forecasts to the farmers. Extension Services will be used to simplify and translate all messages into simplified and local languages for each target state RISK 4 Data sharing is hindered by lack of coordination / willingness of agencies to share data or by technical constraints (e.g., bandwidth issues or local mobile telecommunication networks) ASSUMPTION 4 A cloud data portal for all relevant Stakeholders will be created to facilitate cross-sectorial knowledge

[28] *All outcomes monitored annually in the APR/PIR. It is highly recommended not to have more than 4 outcomes.*

	provided BASELINE: seasonal; daily	phenomena is lacking. There is also a limited understanding of technical weather/climate information jargon (e.g., alerts are not translated into all national dialects). There is also no formalized communication mechanism for alerts and weather/climate information. End-users cannot provide feedback to improve the communication process. BASELINE % Women who receive EWS alerts/CI in target states: 5% % Men who receive EWS alerts/CI in target states: 10% 3. BASELINE Bulletins are currently produced seasonally and daily. However, these forecasts are not sufficiently down-scaled to give localized forecasts/advisories per state.	EWS alerts/CI in target states: 15% 3. TARGET Localized daily and seasonal bulletins for each state Development of at least 2 tailored bulletins and presentation of market research plan on how to implement mobile phone based agricultural advisories, both supporting targeted weather/climate service delivery		sharing cross RISK 5 Trained, qualified engineers/technicians leave for more lucrative positions ("brain drain"). Unavailability and limited sustainability of requisite human resources and technical/operational capacities ASSUMPTIONS 5 Personnel will be supported through international, regional and south-south cooperation knowledge sharing opportunities The Government will assist with recruitment and will mandate that trained personnel must remain working within their respective institution for 2 years in order to transfer knowledge. Sufficient qualified personnel within the NHMS will be available to handle the new equipment/models, data transmission/storage/treatment to prevent continuity breaks in monitoring. RISK 6 Natural disasters (e.g., floods, strong winds) may damage infrastructure. ASSUMPTION 6 Robust infrastructure will be procured and training will be provided for repair and maintenance with the provision of spare parts in each technical, information production agency.
Outcome 2 Residual climate risk to rural	1. At least 1 WII product created for rain-fed farmers / pastoralists	1. Weather Index Insurance is a new concept in Sudan which has never been piloted. Rain-fed farmers and pastoralists in	1. TARGET: 1 WII product piloted in 1 state	1. Insurance company product log 2.	ASSUMPTION 7 Insurance companies will have the experience and knowledge to adopt

livelihoods in the states of greatest rainfall variability addressed through parametric insurance products	2. % increase in the number of market outlets and insurance agents in the rural areas to disseminate MF / WII products 3. Average speed of claim resettlement in all 6 States over the past 10 years 4.Claims ratio in all 6 States over the past 10 years	some states are familiar with micro-insurance via the Connecting Farmers to Market project. However, unclear compensation criteria and long approval and compensation processes deter farmers and pastoralists to purchase the insurance products. BASELINE: WII products have never existed in Sudan 2. Rain-fed farmers and pastoralists are unaware of insurance and financial services because they are located in remote areas. Only Shiekan and Al-Tawania insurance agencies have state presence in the capitals and are familiar with how to cover risks experienced by farmers and pastoralists. For instance, Al-Tawania has been managing the micro-insurance scheme in the Connecting Farmers to Market project. Shiekan Insurance provided approximately 40,000 SRFP with crop and/or livestock insurance in 2011 in the Blue Nile, White Nile, N. Kardofan, N. Darfur, S. Darfur and W. Darfur states. Shiekan's network of 70 branchess and offices facilitates insurance product marketing and deployment. Nonetheless, these agencies are offering traditional insurance services with long approval and compensation processes. It is therefore necessary to increase rural farmer/pastoral	2. TARGET: At least 4 insurance agents per State who are trained on WII and can provide training to Farmer/Pastoral Trade Unions, Extension Services and lead farmers 3. TARGET: Average speed of claim resettlement in all 6 target states by the end of the project is 15 days 4.TARGET: Average claims ratio in all 6 target states by the end of the project is 0.8	a)Training logs for insurance companies b)Study on presence of insurance companies in rural areas 3.Insurance statistics disaggregated according to the following categories: number of rain-fed farmers covered, number of rain-fed pastoralists covered and number of women practicing rain-fed farming/pastoralism covered 4. Claim documentation specific to rain-fed farmers and pastoralists disaggregated by risk category and gender	and adapt the WII to new crops and data because they will be implicated in the design. Also, there is ample budget and time to train insurance agents on the WII product and to obtain feedback from rain-fed farmers and pastoralists. Legal and regulatory frameworks will also be adapted to facilitate the development and delivery of WII. RISK 8 Targeted farmers and pastoralists are sceptical and unwilling to engage into the index-insurance scheme and unable to pay for the product. ASSUMPTION 8 The project will familiarize the target communities on index-insurance that will be designed in a way that is affordable to the target community. Index insurance has lower administrative costs because there are no on-site inspections or individual loss assessments to perform. Costs will be minimized over time through planning of optimal (adaptation oriented) inputs and as yields rise. In addition to lower costs, rain-fed farmers and pastoralists will be more willing to accept the insurance products because the regulatory framework for compensation criteria will be updated so that compensation can become clear and streamlined. ASSUMPTION 9: There will be no delays for insurance compensation which could hinder next year harvests.

		access to WII insurance services. BASELINE: 1 insurance market outlet per state 3. According to Shiekan Insurance and Re-insurance Co. in 2012, over the past 10 years, the average time elapsed between the reported damage and the payment received, BASELINE: Average speed of claim resettlement in all 6 target states over the past 10 years was 35 days 4. The actual value of the insurance compared to its cost or the Claims Ratio, is a good indicator if the insurance product is appropriately priced. According to Shiekan Insurance and Re-insurance Co.: BASELINE: Average claims ratio over the past 10 years in all 6 States was 0.62			ASSUMPTION 10: Reinsurance companies will be willing to back high-risk small holder rain-fed farmers and pastoralists as experience has shown through the Connect to Farmers to Market project and the dissemination of micro-insurance with reinsurance support
Outcome 3 Improved access of vulnerable farmers and pastoralists to financial services for climate change adaptation and disaster risk reduction	1. Design and application (pilot testing) of at least 3 loan products for adaptation farming and livestock production which provide flexible payment schedules for farmers and pastoralists dependent on rain-fed practices 2.One policy has been designed and agreed upon by all	Current Microfinance (MF) outreach serves 400,000 clients (out of a potential 6 million). Only 23% of the total MF clients are located in rural areas, and only 6% of rural and nomadic households in the target states are currently clients (excluding the River Nile State). Stakeholder consultations in the 6 target states indicated that rural populations limit taking out loans from MFIs due to lack of collateral and lack of knowledge/understanding on	1. TARGET: At least 3 flexible MF products developed which are geared towards the needs of rain-fed farmers and pastoralists 2. TARGET: One policy developed mandating the adoption of adaptation technologies for microfinance products tailored to rain-fed farmers and	1.Log of MF products offered and adapted by rain-fed farmers and pastoralists (CBS, SMDC) 2. Review of MF policies (CBS) 3.Log of MF products (CBS, SMDC) and adaptation technologies offered and adapted by rain-fed farmers and pastoralists (RSA) 4. Baseline survey and end of project survey noting the yield/productivity/income of rain-fed farmers and pastoralists	RISK 11 The existence of other informal rural credit programmes which provide more flexibility but which are not linked to adaptation ASSUMPTION 11 Informal microfinance is practiced by local merchants and community members. Informal loans are small in quantity and scale because lenders generally receive personal guarantees rather than real collaterals. As such, informal loans are not geared to assist large

	loan providers to mandate the adoption of adaptation technologies to be provided to rain-fed farmers/pastoralists 3.Number and type of adaptation technologies linked with microfinance services adopted by rain-fed farmers/pastoralists (disaggregated by gender to study women separately) 4.% increase in the productivity and income of rain-fed farmers and pastoralists who use adaptation options/packages linked with MF/MI (as compared with non-participating farmers/pastoralists)	the bureaucratic procedures and regulations. They also found that the existing products were not flexible during periods when no income could be gained (e.g., planting period). BASELINE: There are currently no MF products geared specifically towards SFFP in terms of flexible payment schedules and reasonable collateral requirements. Another issue is that MF is not presently linked with adaptation technologies which have been proven to improve productivity and increase resilience to extreme weather for rain-fed farmers/pastoralists. BASELINE: There are no policies which mandate a link between MF and adaptation technologies and therefore no formalized means to build the climate resilience of farmers and pastoralists so that they can be more productive and capable of paying back loans. The lack of adaptation technologies has been addressed by the LDCF1 project which has provided rainwater harvesting know-how and materials. Also, the Agricultural Research Corporation (ARC) has significant experience in	pastoralists 3. TARGET: At least 3 adaptation technologies adopted by rain-fed farmers and pastoralists in the target states with 1 of these technologies targeting women or youth 4. TARGET: 10% increase in yield and/or income for rain-fed farmers and pastoralists who have access to improved financial services linked with adaptation technologies	in the target regions comparing those who have adopted MF/WII/ Adaptation Technologies/Products/Packages with those who have not.	populations nor to assist in cases of dispute or non-repayment due to the absence of a legal framework. This project will provide the legal and regulatory frameworks to have flexible and tailored loan products and will be able to serve larger populations. Most importantly, the new loans are likely to get better returns because the loans will be linked with adaptation technologies.

		improving crop and livestock production by developing tailored products for farmers and pastoralists (e.g., equipment for irrigation and dryland improvement). ARC acts as the technical, operational arm of the Ministry of Agriculture and is the authorized body for crop variety release and seed certification (such as in IFAD's Seed Development Project). ARC also has strong collaborations with Extension Services and Farmer Field Schools. However, in spite of its strong technical capacity, ARC has limited financing to demonstrate best practices and up-scale its proven adaptation technologies in the rural regions. BASELINE: Consequently, other than in regions covered by the LDCF1 (first NAPA project), SRFPs do not have access to any adaptation technologies or packages. BASELINE: Without access to adaptation technologies farming and pastoral production for smallholders is currently limited.			

4 TOTAL BUDGET AND WORKPLAN

Award ID:	00078764	Project ID(s):	00088863
Award Title:	Climate risk finance		
Business Unit:	SDN10		
Project Title:	Climate risk finance for sustainable and climate resilient rain-fed farming and pastoral systems		
PIMS no.	4591		
Implementing Partner (Executing Agency)	Higher Council for Environment and Natural Resources (HCENR)		

SOF (e.g. GEF) Outcome/Atlas Activity	Responsible Party/ Implementing Agent	Fund ID	Donor Name	Atlas Budgetary Account Code	ATLAS Budget Description	Amount Year 1 (USD)	Amount Year 2 (USD)	Amount Year 3 (USD)	Amount Year 4 (USD)	Amount Yr5 Q1 (USD)	Total (USD)	See Budget Notes:
OUTCOME 1: Institutional and technical capacity for climate observation, forecasting and early warning strengthened at national and local levels	**HCENR**	**62160**	**LDCF**	71600	Travel		10,000	10,000	10,000		30,000	a
				71200	International Expert	14,100	29,100	34,100	19,100	3,600	100,000	b
				71300	National Expert			10,000	40,000	15,000	65,000	c
				71400	Contractual Services	10,600	10,600	33,100	33,100	6,600	94,000	d
				72300	Materials & Goods	332,800	332,800	180,300	180,300	44,800	1,071,000	e
				72400	Communic & Audio Visual Equip	5,000	5,000	5,000	5,000		20,000	f
				72800	Information Technology Equipment	26,900	41,900	34,400	19,400	2,400	125,000	g
				75700	Training, Workshops & Conferences	13,300	13,300	8,300	8,300	1,800	45,000	h
					sub-total LDCF	**402,700**	**442,700**	**315,200**	**315,200**	**74,200**	**1,550,000**	

					Total Outcome 1	**402,700**	**442,700**	**315,200**	**315,200**	**74,200**	**1,550,000**	
OUTCOME 2: Residual climate risk to rural livelihoods in the states of greatest rainfall variability addressed through parametric insurance products	**HCENR**	**62160**	**LDCF**	71600	Travel	20,000	0	0	0	0	20,000	i
				71200	International Expert	125,100	99,100	54,100	54,100	13,600	346,000	j
				71300	National Expert	85,000	70,000	0	0	0	155,000	k
				71400	Contractual Services	72,000	148,000	122,000	112,000	28,000	482,000	l
				72100	Contractual Services Co.	149,000	125,000	79,000	79,000	20,000	452,000	m
				72800	Information Technology Equipment	40,000	0	0	0	0	40,000	n
				75700	Training, Workshops & Conferences	133,300	129,300	63,300	63,300	15,800	405,000	o
					sub-total GEF	**624,400**	**571,400**	**318,400**	**308,400**	**77,400**	**1,900,000**	
					Total Outcome 2	**624,400**	**571,400**	**318,400**	**308,400**	**77,400**	**1,900,000**	
OUTCOME 3: Improved access of vulnerable farmers and pastoralists to financial services for climate change adaptation and disaster risk reduction		**62160**	**LDCF**	71200	International Expert	17,000	17,000	0	0	0	34,000	p
				71300	National Expert	8,000	101,450	109,950	67,300	2,000	288,700	q
				71400	Contractual Services	267,600	277,600	209,600	204,600	50,000	1,009,400	r
				75700	Training, Workshops & Conferences	118,300	212,200	174,300	145,500	17,600	667,900	s
					sub-total GEF	**410,900**	**608,250**	**493,850**	**417,400**	**69,600**	**2,000,000**	
		4000	**UNDP**	72400	Grant	150,000	150,000	150,000	150,000		600,000	t
					sub-total UNDP	**150,000**	**150,000**	**150,000**	**150,000**		**600,000**	
					Total Outcome 3	**560,900**	**758,250**	**643,850**	**567,400**	**69,600**	**2,600,000**	
PROJECT MANAGEMENT UNIT	**HCENR**	**62160**	**LDCF**	71600	Travel	5,000	5,000	5,000	5,000	3,000	23,000	u
				71300	National consultants	20,000	20,000	20,000	20,000	13,800	93,800	v

				72500	Supplies	1,700	1,700	1,700	1,700	400	7,200	w
				74599	UNDP Cost recovery charges	34,300	34,300	28,350	28,350	700	126,000	x
					sub-total	**61,000**	**61,000**	**55,050**	**55,050**	**17,900**	**250,000**	
					Total Management	**61,000**	**61,000**	**55,050**	**55,050**	**17,900**	**250,000**	
					PROJECT TOTAL	**1,649,000**	**1,833,350**	**1,332,500**	**1,246,050**	**239,100**	**6,300,000**	

Summary of Funds:[29]

	Amount Year 1	Amount Year 2	Amount Year 3	Amount Year 4	Amount Year 5 Q1	Total
Shiekan Insurance and Reinsurance Co. Ltd.	752,900	752,900	752,900	752,900	188,400	**3,200,000**
Agricultural Research Corporation	470,600	470,600	470,600	470,600	117,600	**2,000,000**
Kassala, Gedarif, River Nile, North Kordofan, White Nile and South Darfur States	705,900	705,900	705,900	705,900	176,400	**3,000,000**
Higher Council of Environment	235,300	235,300	235,300	235,300	58,800	**1,000,000**
Sudan Meteorological Authority	470,600	470,600	470,600	470,600	117,600	**2,000,000**
Agricultural Bank of Sudan	1,647,100	1,647,100	1,647,100	1,647,100	411,600	**7,000,000**
UNDP	150,000	150,000	150,000	150,000		**600,000**
GEF	1,499,000	1,683,350	1,182,500	1,096,050	239,100	**5,700,000**
TOTAL	**5,931,400**	**6,115,750**	**5,614,900**	**5,528,450**	**1,309,500**	**24,500,000**

Budget Note	**Description of cost item (Activity and Output number)**
a.	-Travel costs for validation of soil and land cover / use satellite images using field observations to serve weather index and insurance needs (1.2)
b. *	-Training for of at least 10 MOWRI engineers, 4 SMA engineers and 3 RSA engineers on flow meter calibration in wadis and soil infiltration rate measurements (1.1) - Training for 12 engineers / 8 technicians within SMA on new automatic climate and synoptic stations (1.2)

[29] *Summary table should include all financing of all kinds: GEF financing, cofinancing, cash, in-kind, etc...*

	- Training in satellite-based crop and drought monitoring for 2 RSA technicians and 3 RSA specialists (1.2) - Capacity reinforcement for SMA to produce forecasts (on hourly, daily and seasonal timescales for now casting, daily/weekly forecasts and seasonal forecasts) is strengthened by training 8 meteorologists and 12 specialized technicians (1.3) - Training on LEAP (1.3)
c. **	- Capacity reinforcement by a National financial expert on long-term sustainable budgeting and establishing sustainable cost-recovery mechanisms with revenues generated from selling tailored weather/climate products and risk maps (1.3) - Development of a mobile-phone partnership between SMA, ARC, extension service representatives and a mobile phone company so that rain-fed farmers and pastoralists can receive forecast/climate information and risk / agricultural / pest / livestock advisories by SMS (1.4)
d.	- Revitalization of the Water Satisfaction Index project (1.2) - Gender disaggregated rapid surveys of targeted users of climate information conducted to understand the social and economic costs and benefits of using advisories and warnings to mitigate risks (1.3) - Implementation of a formalized feedback mechanism from beneficiaries to NHMS/ARC on the utility of alerts, weather/climate info/forecasts/predictions and agricultural advisories (1.4) - A public awareness campaign in each of the vulnerable agro-ecological states to promote the utility of climate information and the Early Warning System for adaptation to climate change (1.4)
e.	- Procurement of 8 water level meters to be placed, 3 manual, hydrological stations and 2 acoustic Doppler flow meters (ADCP) for (MOWRE) (1.1) - Purchase of high resolution remote sensing data for RSA and MOWRE to provide a hydrological baseline in terms of delineating the drainage network and mapping agricultural and rangeland areas (1.1) -Purchase of CB radios, 200 mobile phones and SMS communication services to enable fast transmission of manually collected hydrological data (1.1) -Procurement and installation of 7 automatic climate stations 6 automatic synoptic stations with telemetry and 162 rain gauges (1.2) - Purchase of high resolution remote sensing data (e.g., less than 2 km resolution) and renewal of licenses for drought predictions (1.2)
f.	- Development of a standardized communication operation procedure (SOP) by HAC involving all EWS agencies and grassroots NGOs (1.4) - Development of a mobile-phone partnership between SMA, ARC, extension service representatives and a mobile phone company so that rain-fed farmers and pastoralists can receive forecast/climate information and risk / agricultural / pest / livestock advisories by SMS (1.4)
g.	- Renewal and purchase of hydrological modelling licenses of hydromet software including training for nine (9) engineers with modelling software (RSM, SMA, MOWRE) (1.1) - Digitization of written hydrological/meteorological/climate/agricultural data for data rescue purposes and to facilitate the generation of climate predictions, weather forecasts and agricultural advisories (RSA, SMA MOWRE, ARC) (1.1) - License renewal for the TAMSAT product including training by an expert on Cold Cloud Duration to effectively use satellite images to determine rainfall estimates (1.2) - Establishment of a farm information management system (1.3) - Purchase of LEAP (1.3) - Incorporation of space-based information into Sudan's EWS (1.3)
h.	- Knowledge sharing between RSA, SMA and MOWRE on hydrological (1.1)

	- Knowledge transfer between Sudan NHMS (RSA, SMA, MOWRE and the Ministry of Agriculture) and regional and international agencies on vegetation and drought monitoring (1.2) - Formalized coordination with the DRR project National Early Warning Committee to ensure forecast bulletin or alert information is provided (1.3) Revitalization of targeted seasonal forecast by training local focal points (1.3)
i.	- Travel costs for field validation to see if the farmers get their inputs on time and if/how they are being delivered in order to develop insurance premiums (2.1)
j.*	- Study on how to improve delivery of inputs including local distribution of drought resistant seeds and link credit and lending to activities which support building resilience and adaptation to climate change (2.1) - Training by a WII specialist with regulators and policy makers in order to develop a suitable legal, regulatory and policy environment for WII (2.2) - Creation of regulatory policy document to set out the types of Sharia-compliant products that may be developed and include a robust dispute resolution process (2.2) - Design of at least 6 tailored Weather Index Insurance products, based on the livelihoods in the 6 target zones (2.3) - Training for the Internal Sharia compliant committee so that the loan approval process can be decreased from up to 4 months to a period of one week (2.3)
k.**	- Environmental Impact Assessment (2.2) - Study on demand of pastoralists for microfinance and insurance (2.3)
l.	- Feasibility assessment over 3.5 months to test the viability of an insurance scheme (2.1) - International reinsurance company agreement secured (2.2) - Identification of farmers and pastoralists willing to participate in WII schemes and to accept the conditions of the loans (2.3) - Transfer of data into the Cloud data server to serve as a national weather databank (2.3) - Development of a toll-free number complaints service to assist SRFPs in the event of dispute (2.3) - Public awareness campaign (by insurance representatives and humanitarian organizations (e.g., Practical Action)) to provide awareness and education on the utility and importance of agricultural insurance services (2.4) - Increase in the number of market outlets and insurance agents in the rural areas to disseminate insurance awareness and deliver services, including by the development of mobile banking/insurance services (2.4) - Monitoring and Evaluation (2.4)
m.	- Development of a white paper detailing recommendations for changes or additions to existing legislation (2.2) - Development of a nationally based WII marketing and development team associated with the WII international specialist organization (2.3) - Development of guidelines and manuals for approved products (2.3) - Production of training syllabus on the WII products, specific to each livelihood zone (2.4) - One-week training for 4 regional insurance focal points on Weather Index Insurance in each state (2.4)
n.	- Purchase of a Cloud secure data service (2.3)
o.	- Framework workshops with regulators and policy makers to set out the next steps for drafting a suitable Weather Index Insurance regulatory document (2.2) - Development of partnerships with projects which can facilitate the link between micro-finance and micro-insurance and savings (2.2)

	- Development of clear criteria for compensation regarding risks including rainfall thresholds per state (2.2) - Training for local insurers and local brokers to enable them to adapt and underwrite Weather Index Insurance contracts (2.3) - Facilitation of data sharing between all institutions managing hydro-meteorological equipment and MFIs/Insurance companies (2.3) - Study tour to a south-south cooperative country (e.g., India or Pakistan) to understand and see a mature (2.3) - Development of an outreach strategy with a two-day workshop with key distribution Stakeholders such as banks/MFIs and cooperatives (2.4) - Series of training courses led by the TOTs in each implementation zone for farmer cooperatives, extension officers and lead farmers (2.4)
p.*	- Development of rules and regulations to bundle microfinance and WII (3.2) - Design of a simple and appropriate financial services management manual for SRFP groups/associations (3.4)
q **	- Review the Agricultural Bank of Sudan's previous experience with mobile banking and develop an improved mobile banking service (3.1) - Development of pastoral GPS tracking and mobile-phone based risk advisory services geared towards pastoralists (3.1) - Design and testing of loan products for adaptation farming and livestock production (3.3)
r	- Assessment of previous experiences, design and development of an effective agro-advisory service to assist MF/MI and ensure the added value of adaptation technologies for risk minimization (3.1) - Preparation of technical manuals detailing sustainable agricultural and pastoral activities (3.1) - Assessment of regulatory frameworks that control access of small producers in the rain-fed sector to microfinance services and unification of regulations among banks (3.2) - Obtain LoAs from all involved banks and microfinance institutions to adhere to the improved and unified regulations (3.2) - Mandating the adoption of proven, climate change adaptation technologies as a prerequisite for obtaining access to credit and micro insurance services (3.2) - National level Coordination, M&E and Communication Support (3.2) - Design a monitoring system for the newly designed loan products and train microfinance provides on the system (3.3) - Start delivery of the newly designed and tested products to agro-pastoralists through the partner microfinance providers utilizing appropriate means for loan delivery (3.3) - Long-term and periodic monitoring and assessment of adaptation-oriented microfinance performance and improvement of loan products and systems based on the annual assessment results (3.3) - Organization of SRFP in the projected targeted localities where they were not organized to form SRFP associations (3.4) - State level Coordination and M&E (3.4)
s	- Organization, centralization and promotion of lessons learned on best agricultural/pastoral practices (3.1) - Identification, documentation and promotion of proven adaptation crop and livestock production technology packages through on-farm validation (3.1) - Rectify and improve the existing technology transfer programs to disseminate proven technology packages to agro-pastoralists (3.1) - Capacity building and institutional support targeting adaptation technology development and transfer (3.1) - Capacity building for ARC on crop/livestock-rangeland monitoring, scenario production and Decision Support Systems to be integrated into MF/WII products (3.1) - Formalization of community-driven adaptation plans into Sudan's Five-Year Plan (2017-2021) (3.1)

	- Awareness raising of agro-pastoralists in the targeted areas on the new regulatory framework (3.2) - Promotion of loan products among the established farmers associations participating in the project (3.3) - Gender (e.g., youth, women) focused training to inform rain-fed farmers and pastoralists on MF/WII and climate change adaptation technologies (3.3) - Capacity development for the Agricultural Extension and Technology Transfer Administrations (AETTA) in the targeted localities to organize farmers in groups and associations (3.4) - Training for Training of Trainers (TOTs) and the relevant staff of (AETTA) in the targeted localities on the agro pastoralist associations' financial services management manual (3.4) - Capacity development for existing and newly formed SRFP associations on the financial services management manual (3.4)
t.	- Cash co-financing from UNDP
u.	- Travel costs to conduct field validation of project progress in target zones
v.	- Salaries for the project management unit including the Project Manager, a Financial and Administrative Assistant
w.	- Supplies for project management office facilities
x.	- UNDP cost recovery charges as stated in Annex 3

* Assuming international expert fee: $3550 flight/visas, hotel $100, daily expenses $75 and salary $1000 per day

** Assuming national expert fee: $250 per day

No.	Component	Type of Expert	Role	Days Required	Fee (USD)
1	1	International	Flow meter calibration, infiltration measurement support	14	20,000
2	1	International	Training on new automatic climate and synoptic stations	14	20,000
3	1	International	Satellite based crop and drought monitoring	14	20,000
4	1	International	Forecasting training for SMA	14	20,000
5	1	International	LEAP training	14	20,000
6	1	National	Development of mobile-phone partnerships, weather advisories by SMS	120	30,000
7	2	International	Study on how to improve delivery of inputs	14	20,000
8	2	International	Training by WII expert for regulators and policy makers	28	36,450
9	2	International	Creation of regulatory policy document for WII	22	29,400
10	2	National	Environmental Impact Assessment	60	15,000
11	2	National	Study on demand of pastoralists for MF and insurance	560	140,000
12	2	International	Design of WII products (other costs in contractual services)	200	238,550

13	2	Contractual	Development of nationally-based WII marketing team	175	209,175
14	2	International	Training for Internal sharia compliant committee	22	29,400
15	3	National	Assessment and suggestions for mobile banking	136	34,000
16	3	National	Development of GPS pastoral tracking and mobile phone based risk advisory service	136	34,000
17	3	International	Development of rules and regulations to bundle MF and WII	136	163,350
18	3	National	Development and testing of loan products for adaptation farming and livestock production	600	150,000
19	3	National	Organization of SRFP to form associations	340	85,000
20	3	National	Design of an appropriate financial services management manual for SRFP	270	67,500
No.	**Component**	**PM**	**Project Management Role**	**Monthly Salary (USD)**	**Project Total (USD)**
21	All	National	Admin/Finance	900	45,900
22	All	National	Project Manager	1800	91,800
23	All	National	Project Coordinator	200***	10,200
24	All	National	Secretary	500	25,500
25	All	National	Driver	300	15,300
26	All	National	Monitoring and Evaluation expert	1800	91,800
27	All	National	Field Communication specialist	1800	91,800
28	All	National	State Coordinator (6 in total)	1100	56,100

*** The project will be responsible for paying the indemnities for the National Project Coordinator.

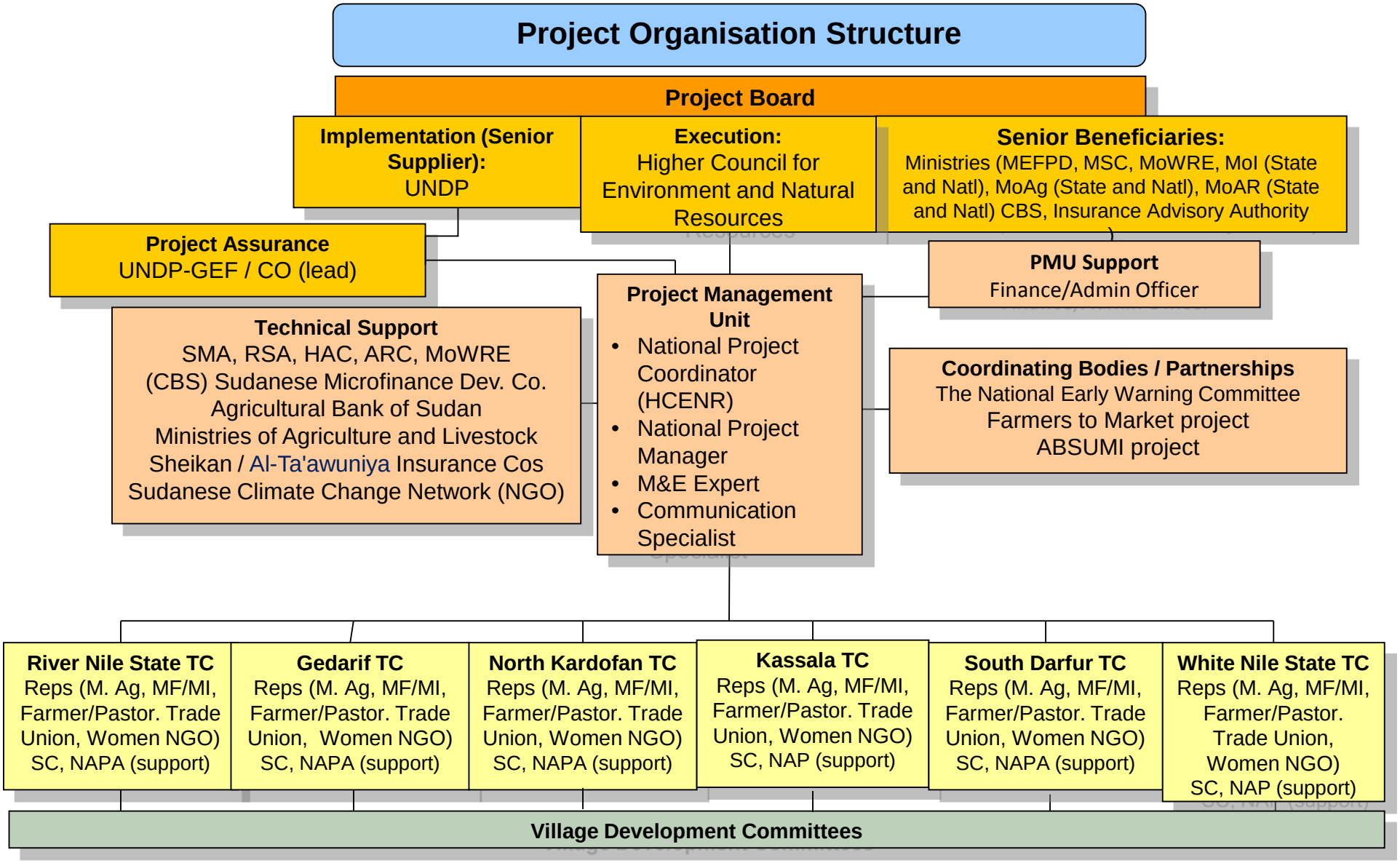
5 MANAGEMENT ARRANGEMENTS

234. The execution modality for this project will be UNDP's National Implementation Modality. The Implementing Partner (IP) for this project will be the Higher Council for the Environment and Natural Resources (HCENR) who will have project ownership and will appoint a National Project Manager (NPM) and National Project Coordinator (NPC), paid for by the project, to coordinate project operations. The main beneficiaries of this project will be the Ministry of Agriculture, Ministry of Environment, Forestry and Physical Development, the Ministry of Science and Communication, the Ministry of Water Resources and Electricity, the Ministry of the Interior, the Ministry of Livestock, Bank of Khartoum and the Central Bank of Sudan. The Project Board, led by the HCENR, will be responsible for approving program activities. Based on the approved activities, the Project Management Unit (PMU) will ensure the provision of funds to all institutions/organizations for their respective activities. All executing agencies will be responsible for managing tasks related to their institution/organization. A Memorandum of Understanding and Terms of Reference indicating the role of each executing agency will be developed under the guidance of PMU during project implementation. A full capacity assessment of the IP was conducted in October 2013 (Annex 7).

235. The UNDP CO will provide specific support services for proper project implementation, as required, through its Administrative, Programme and Finance Units and through support from UNDP Regional Centre. A Letter of Agreement (Annex 3) describes all additional services required of UNDP beyond its role in oversight between the IP and UNDP. The direct project costs requested of UNDP are also detailed in the Total Budget Work Plan (TBWP, Section 4).

236. The Stakeholder Involvement Table indicating the key inputs of all project partners during project implementation is provided in Table 9.

237. A diagram detailing the Management Arrangements, including the responsible decentralized agencies and support committees/organizations, is presented below. The roles and responsibilities of the parties involved in managing the project are described below.


Project Organisation Structure
Project Board
Implementation (Senior Supplier): UNDP
Execution: Higher Council for Environment and Natural Resources
Senior Beneficiaries: Ministries (MEFPD, MSC, MoWRE, MoI (State and Natl), MoAg (State and Natl), MoAR (State and Natl) CBS, Insurance Advisory Authority
Project Assurance UNDP-GEF / CO (lead)
PMU Support Finance/Admin Officer
Technical Support SMA, RSA, HAC, ARC, MoWRE (CBS) Sudanese Microfinance Dev. Co. Agricultural Bank of Sudan Ministries of Agriculture and Livestock Sheikan / Al-Ta'awuniya Insurance Cos Sudanese Climate Change Network (NGO)
Project Management Unit
• National Project Coordinator (HCENR)
• National Project Manager
• M&E Expert
• Communication Specialist
Coordinating Bodies / Partnerships The National Early Warning Committee Farmers to Market project ABSUMI project
River Nile State TC Reps (M. Ag, MF/MI, Farmer/Pastor. Trade Union, Women NGO) SC, NAPA (support)
Gedarif TC Reps (M. Ag, MF/MI, Farmer/Pastor. Trade Union, Women NGO) SC, NAPA (support)
North Kardofan TC Reps (M. Ag, MF/MI, Farmer/Pastor. Trade Union, Women NGO) SC, NAPA (support)
Kassala TC Reps (M. Ag, MF/MI, Farmer/Pastor. Trade Union, Women NGO) SC, NAP (support)
South Darfur TC Reps (M. Ag, MF/MI, Farmer/Pastor. Trade Union, Women NGO) SC, NAPA (support)
White Nile State TC Reps (M. Ag, MF/MI, Farmer/Pastor. Trade Union, Women NGO) SC, NAP (support)
Village Development Committees

238. The **Project Board** established by a ministerial order will be directed by the HCENR and will be responsible for approving reports and activities. It will also provide guidance for proper implementation of the project. Members of the Project Board will include UNDP, representatives from the Ministry of Environment, Forestry and Physical Development (MEFPD), the Ministry of Science and Communication (MSC), the Ministry of Water Resources and Electricity (MoWRE), the Ministry of the Interior (MoI), the Federal Ministry of Agriculture (MoAg) / Ministry of Livestock (MoL) and the 6 target State Ministries of Agriculture / Livestock, the Ministry of Finance, the Insurance Advisory Authority, Bank of Khartoum and the Central Bank of Sudan (CBS). The Project Board will be responsible for making management decisions for the project in particular when guidance is required by the Project Management Unit. The Project Board plays a critical role in project monitoring and evaluation by quality assuring processes and products and using evaluations for performance improvement, accountability and learning. It i) ensures that required resources are committed, ii) arbitrates on any conflicts within the project and iii) negotiates a solution to any problems with external bodies. In addition, it approves the appointment and responsibilities of the Project Management Unit and any delegation of its project assurance responsibilities. Based on the approved Annual Work Plan, the Project Board can also consider and approve any essential deviations from the original plan. The Committee will convene 2 times per year, during each semester and can include a maximum of 15 participants. Potential members of the Project Board are reviewed and agreed upon during the PAC meeting. Representatives from other institutions/organizations can be included in the Board as appropriate. The Project Board contains four distinct roles which have been filled as follows:

1) **An Executive**: individual representing the project ownership to chair the group.
    - Higher Council for Environment and Natural Resources
2) **Senior Supplier**: group representing the interests of the parties concerned which provide funding for specific cost sharing projects and/or technical expertise to the project. The Senior Supplier's primary function within the Project Board is to provide guidance regarding the technical feasibility of the project and alignment of the outcomes/outputs with the LDCF.
    - UNDP
3) **Senior Beneficiary**: group of individuals representing the interests of those who will ultimately benefit from the project. The Senior Beneficiary's primary function within the Project Board is to ensure the realization of project results from the perspective of project beneficiaries.
    - The Ministry of Environment, Forestry and Physical Development, the Ministry of Science and Communication, the Ministry of Water Resources and Electricity, the Ministry of the Interior, the Ministry of Agriculture, the Ministry of Animal Resources, Bank of Khartoum and the Central Bank of Sudan as well as others to be determined during the Inception Workshop
4) The **Project Assurance** role supports the Project Board Executive by carrying out objective and independent project oversight and monitoring functions in line with UNDP and GEF/LDCF policies and procedures.
    - UNDP Sudan Programme Officer and UNDP-GEF

239. **National Project Manager**: The National Project Manager (NPM) has the authority to run the project on a day-to-day basis on behalf of the Implementing Partner within the constraints laid down by the Board. The NPM's prime responsibility is to ensure that the project produces the results specified in the project document, to the required standard of quality and within the specified constraints of time and cost. The NPM is accountable to the UNDP, the IP and the Project Board for the quality, timeliness and effectiveness of the activities carried out, as well as for the use of funds. He/she will also be responsible for coordinating budgets and work plans on the State Level with the State Coordinators and Technical Committees. The NPM will be recruited by HCENR. He/she will be supported by a Project Coordinator, a

specialist in Monitoring and Evaluation / Knowledge Management and a Field Communications Expert. His/her salary and indemnities will be paid for by the project.

240. **National Project Coordinator**: A representative from the Higher Council on the Environment will act as the Project Coordinator and will support the NPM with overall administration, oversight, coordination of activities and maintaining a liaison with UNDP. The Project Coordinator will be appointed by the Higher Council based on a competitive selection process. The Project Coordinator's salary will be provided by HCENR. The project will be responsible for paying the indemnities for the National Project Coordinator.

241. **Monitoring and Evaluation Expert:** A competitive selection process will be used to choose a national Monitoring and Evaluation expert. Due to the nature of the adaptation project requiring significant expertise in financial services, this expert will be recruited to ensure successful implementation of Components 2 and 3 of the project concerning the development and pilot testing of Weather Index Insurance and Microfinance products. The M&E expert must be able to liaise easily with the Ministry of Finance, the Central Bank of Sudan, insurance companies, and MFIs. Furthermore, due to the fact that this project will be pilot testing financial products and adaptation technologies for the first time in Sudan, the expert must have significant expertise in Knowledge Management and capturing lessons learned for effective scaling-up. He/she must summarize findings and lessons learned on an annual basis and be responsible for documenting complete lists of beneficiaries, numbers, types of benefits and related information to help with quantifying project indicators (See Project Results Framework, Section 3). The M&E expert will also be responsible for monitoring the work of the Technical Committees to ensure activity prioritization and development is not biased. The M&E expert will ultimately report the results to supplement UNDP's Adaptation Learning Mechanism.

242. **Communication Specialist:** A national communication specialist will be chosen in an open selection process. This specialist will be required to have significant knowledge of microfinance and insurance. The role of the specialist will be to ensure public awareness of MF/WII products on State levels and to validate that training programmes and manuals are effective in building financial literacy (e.g., facilitating Training of Trainer workshops). He/she will also provide support in mobilizing and organizing farmers and pastoralists so that group lending can take place (thereby spreading risks) and will act as a liaison with state insurance agents and MFIs and NGOs. On a regular basis, the Specialist will provide a relay of information to the NPM on what is successful or not working in each target State so that MF/WII products and their respective regulatory frameworks can be continually improved and targeted to smallholder rain-fed farmers and pastoralists.

243. **PMU Support**: The project support role provides project administration, management, financial and technical support to the NPM as required by the needs of the individual project or NPM.

244. Note that the Project Management Unit's overall role will be to ensure comprehensive technical and management support is provided to project activities and local beneficiaries, such as overseeing knowledge management and Monitoring and Evaluation. The PMU must have adequate multi-disciplinary technical capacity to be able to support technical, financial and insurance-related activities. As a result, the team of NPM, NPC, Communication Specialist and M&E Expert must be able to work with a large range of natural resource, economic, policy and organizational issues, and be able to ensure that activities are designed and implemented in-line with national and international best practices.

245. **State Technical Committees (TC)**: At the State level in each target State, the project implementation will be overseen by a **State Coordinator (SC)** appointed by the State Ministry of Agriculture and guided by a regional Technical Committee comprised of representatives from the Farmer/Pastoral Trade Unions (2), the Agricultural Extension and Technology Transfer Administration (1), the Agricultural Research Corporation, an adaptation technology expert, (1), a state MFI (1), a state insurance agent (1) and a relevant NGO promoting gender (1). The current State NAPA or NAP coordinator will provide a support role to the TCs to ensure no duplication of activities with other

adaptation-related initiatives. The TCs are responsible for discussing technical issues, setting priorities, preparing work plans, resolving conflicts and supervising site-level activities. The TCs are accountable to the Project Management Unit. Costs will be covered by both the State Ministries and the Project.

246. **Technical Support**: Regular technical project support will be provided by appointed focal points from the Sudan Meteorological Authority (SMA), the Remote Sensing Authority (RSA), the Ministry of Water Resources and Electricity (MoWRE), the Agricultural Research Corporation (ARC), the Central Bank of Sudan (CBS), the Sudanese Microfinance Development Corporation (SMDC), the Shiekan Insurance and Reinsurance Company, the Al-Ta'awuniya Insurance Company and the Sudanese Climate Change Network NGO who will be responsible for the delivery of results in their respective departments / organizations. They will meet quarterly with the Project Management Unit.

247. **Coordinating Bodies / Partnerships**: The project will also facilitate coordination and/or partnerships with the National Early Warning Committee to be established by the ***National Disaster Risk Management Programme in Sudan*** project, as well as the ***Farmers to Market*** and ***ABSUMI*** projects.The project will also ensure a strong partnership with the Ministries of Agriculture and Animal Resources, both at the federal and state levels.

6 MONITORING FRAMEWORK AND EVALUATION

The project will be monitored through the following M&E activities. The M&E budget is provided in the table below. The M&E framework set out in the Project Results Framework in Part III of this project document is aligned with the AMAT and UNDP M&E frameworks.

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

The **Inception Workshop** should address a number of key issues including:

- Assist all partners to fully understand and take ownership of the project. Detail the roles, support services and complementary responsibilities of UNDP CO and Regional Coordinating Unit (RCU) staff (i.e. UNDP-GEF Regional Technical Advisor) vis-à-vis the project team. Discuss the roles, functions, and responsibilities within the project's decision-making structures, including reporting and communication lines, and conflict resolution mechanisms. The Terms of Reference for project staff will be discussed again as needed.
- Based on the project results framework and the LDCF related AMAT set out in the Project Results Framework in Section III of this project document, and finalize the first annual work plan. Review and agree on the indicators, targets and their means of verification, and recheck assumptions and risks.
- Provide a detailed overview of reporting, monitoring and evaluation (M&E) requirements. The Monitoring and Evaluation work plan and budget should be agreed and scheduled.
- Discuss financial reporting procedures and obligations, and arrangements for annual audit.
- Plan and schedule Steering Committee meetings. Roles and responsibilities of all project organisation structures should be clarified and meetings planned. The first Steering Committee meeting should be held within the first 12 months following the inception workshop.

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

Quarterly:

- Progress made shall be monitored in the UNDP Enhanced Results Based Management Platform.
- Based on the initial risk analysis submitted, the risk log shall be regularly updated in ATLAS.

  Risks become critical when the impact and probability are high. Note that for UNDP/GEF projects, all financial risks associated with financial instruments such as revolving funds, microfinance schemes, or capitalization of ESCOs are automatically classified as critical on the basis of their innovative nature (high impact and uncertainty due to no previous experience justifies classification as critical).
- Based on the information recorded in Atlas, a Project Progress Reports (PPR) can be generated in the Executive Snapshot.
- Other ATLAS logs will be used to monitor issues, lessons learned. The use of these functions is a key indicator in the UNDP Executive Balanced Scorecard.

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

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

- Progress made toward project objective and project outcomes - each with indicators, baseline data and end-of-project targets (cumulative)
- Project outputs delivered per project outcome (annual).
- Lesson learned/good practice.
- AWP and other expenditure reports
- Risk and adaptive management
- ATLAS QPR

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

Mid-term of project cycle: The project will undergo an independent Mid-Term Review at the mid-point of project implementation (expected to be in May 2016). The Mid-Term Review will determine progress being made toward the achievement of outcomes and will identify course correction if needed. It will focus on the effectiveness, efficiency and timeliness of project implementation; will highlight issues requiring decisions and actions; and will present initial lessons learned about project design, implementation and management. Findings of this review will be incorporated as recommendations for enhanced implementation during the final half of the project's term. The organization, terms of reference and timing of the mid-term review will be decided after consultation between the parties to the project document. The Terms of Reference for this Mid-term review will be prepared by the UNDP CO based on guidance from the Regional Coordinating Unit (RCU) and UNDP-GEF. The LDFC/SCCF AMAT as set out in the Project Results Framework (in Section III of this project document) will also be completed during the mid-term evaluation cycle.

End of Project: An independent Terminal Evaluation will take place three months prior to the final PB meeting and will be undertaken in accordance with UNDP-GEF guidance. The terminal evaluation will focus on the delivery of the project's results as initially planned (and as corrected after the mid-term review, if any such correction took place). The terminal evaluation will look at impact and sustainability of results, including the contribution to capacity development and the achievement of global environmental benefits/goals. The Terms of Reference for this evaluation will be prepared by the UNDP CO based on guidance from the Regional Coordinating Unit and UNDP-GEF. The LDFC/SCCF AMAT as set out in the Project Results Framework in Section III of this project document) will also be completed during the terminal evaluation cycle. The Terminal Evaluation should also provide recommendations for follow-up activities and requires a management response, which should be uploaded to PIMS and to the UNDP Evaluation Office Evaluation Resource Center (ERC).

Learning and knowledge sharing: Results from the project will be disseminated within and beyond the project intervention zone through existing information sharing networks and forums.

The project will identify and participate, as relevant and appropriate, in scientific, policy-based and/or any other networks, which may be of benefit to project implementation though lessons learned. The project will identify, analyze, and share lessons learned that might be beneficial in the design and implementation of similar future projects.

There will be a two-way flow of information between this project and other projects of a similar focus.

Audit: This project will be audited in accordance with UNDP Financial Regulations and Rules and applicable audit policies.

Table 10: Project Monitoring and Evaluation Work Plan and Budget

Type of M&E activity	**Responsible Parties**	**Budget US$** *Excluding project team staff time*	**Time frame**
Inception Workshop and Report	▪ Project Manager ▪ PIU (Project Implementation Unit) ▪ UNDP CO, UNDP GEF	Indicative cost: 10,000	Within first two months of project start up
Measurement of Means of Verification of project results.	▪ UNDP GEF RTA/Project Manager will oversee the hiring of specific studies and institutions, and delegate responsibilities to relevant team members. ▪ PIU, esp. M&E expert	To be finalized in Inception Phase and Workshop.	Start, mid and end of project (during evaluation cycle) and annually when required.
Measurement of Means of Verification for Project Progress on output and implementation	▪ Oversight by Project Manager ▪ PIU, esp. M&E expert ▪ Implementation teams	To be determined as part of the Annual Work Plan's preparation. Indicative cost is 20,000	Annually prior to APR/PIR and to the definition of annual work plans
ARR/PIR	▪ Project manager ▪ PIU ▪ UNDP CO ▪ UNDP RTA ▪ UNDP EEG	None	Annually
Periodic status/ progress reports	▪ Project manager and team	None	Quarterly
Mid-term Review	▪ Project manager ▪ PIU ▪ UNDP CO ▪ UNDP RCU ▪ External Consultants (i.e. evaluation team)	Indicative cost: 40,000	At the mid-point of project implementation.
Terminal Evaluation	▪ Project manager ▪ PIU ▪ UNDP CO ▪ UNDP RCU ▪ External Consultants (i.e. evaluation team)	Indicative cost : 40,000	At least three months before the end of project implementation
Audit	▪ UNDP CO ▪ Project manager ▪ PIU	Indicative cost per year: 3,000 (12,000 total)	Yearly
Visits to field sites	▪ UNDP CO ▪ UNDP RCU (as appropriate) ▪ Government representatives	For GEF supported projects, paid from IA fees and operational budget	Yearly for UNDP CO
TOTAL indicative COST Excluding project team staff time and UNDP staff and travel expenses		US$ 122,000 (+/- 5% of total GEF budget)	

7 LEGAL CONTEXT

This document together with the CPAP signed by the Government and UNDP which is incorporated by reference constitute together a Project Document as referred to in the SBAA and all CPAP provisions apply to this document.

Consistent with the Article III of the Standard Basic Assistance Agreement, the responsibility for the safety and security of the implementing partner and its personnel and property, and of UNDP's property in the implementing partner's custody, rests with the implementing partner.

The implementing partner shall:

a) put in place an appropriate security plan and maintain the security plan, taking into account the security situation in the country where the project is being carried;

b) assume all risks and liabilities related to the implementing partner's security, and the full implementation of the security plan.

UNDP reserves the right to verify whether such a plan is in place, and to suggest modifications to the plan when necessary. Failure to maintain and implement an appropriate security plan as required hereunder shall be deemed a breach of this agreement.

The implementing partner agrees to undertake all reasonable efforts to ensure that none of the UNDP funds received pursuant to the Project Document are used to provide support to individuals or entities associated with terrorism and that the recipients of any amounts provided by UNDP hereunder do not appear on the list maintained by the Security Council Committee established pursuant to resolution 1267 (1999). The list can be accessed via http://www.un.org/Docs/sc/committees/1267/1267ListEng.htm. This provision must be included in all sub-contracts or sub-agreements entered into under this Project Document.

8 ANNEXES

Annex 1: Risk Analysis

#	Description of the risk	Potential consequence	Countermeasures / Mngt response	Type (Risk category) Environmental Financial Operational Organizational Political Regulatory Strategic Other	Probability & Impact (1-5, low to high)	Owner	Submitted dupdated by	Last Update	Status
1	Sudan does not have enough government financing to continue monitoring/research and will not be able to consider recurring O&M/training costs in government budget lines	Warnings and climate information become less accurate and useful across sectors, with a particular impact on weather-index based insurance and forecasting	By making EWS/CI more useful to various sectors, this pushes the Government to include stable, core budget lines for climate/weather services due to their cross-sectoral importance Capacity for long-term planning and costing will be built in all information production agencies.	Organizational, Strategic, Financial	P=3 I=4				
2	Data sharing is hindered by lack of coordination / willingness of agencies to share data or by technical constraints (e.g., bandwidth issues or local mobile telecommunication	Threat to sustainability of weather/climate information and agricultural advisory dissemination. Threat to vulnerable population's ability to adapt to climate change (particularly	A cloud data portal for all relevant Stakeholders including extension officers will be created (see Figure 1) where knowledge will be shared for cross-sectoral use (e.g., health, agriculture planning). A Public Private Partnership and service level agreement between the information	Strategic	P = 2 I = 2				

#	Description of the risk	Potential consequence	Countermeasures / Mngt response	Type (Risk category) Environmental Financial Operational Organizational Political Regulatory Strategic Other	Probability & Impact (1-5, low to high)	Owner	Submitted dupdated by	Last Update	Status
	networks)	for agricultural production)	production agencies and Zain, an internet and mobile phone service provider, will be established with regards to minimizing start-up costs for mobile phone plans, modems as well as increasing bandwidth for internet connections.						
3	Trained, qualified engineers/technicians leave for more lucrative positions ("brain drain"). Unavailability and limited sustainability of requisite human resources and technical/operational capacities	May limit/delay project implementation	A major part of the project is to strengthen institutional and technical capacity for planning, designing and implementing Early Warning Systems Personnel will be supported through international, regional and south-south cooperation knowledge sharing opportunities The Government will assist with recruitment and will mandate that trained personnel must remain working within their respective institution for at least 2 years after training.	Operational, Strategic	P=3 I=2				

#	Description of the risk	Potential consequence	Countermeasures / Mngt response	Type (Risk category) Environmental Financial Operational Organizational Political Regulatory Strategic Other	Probability & Impact (1-5, low to high)	Owner	Submitted dupdated by	Last Update	Status
			Sufficient qualified personnel within the NHMS will be available to handle the new equipment/models, data transmission/storage/treatment to prevent continuity breaks in monitoring.						
4	Natural disasters damage infrastructure (particularly floods)	Threat to operational sustainability of project Weather network becomes less extensive and representative for forecasting	Robust infrastructure will be procured and training will be provided for repair and maintenance with the provision of spare parts in each technical, information production agency.	Operational	P = 3 I = 4				
5	Index insurance and the adoption of creative solutions, such as remotely sensed data-based indices, are likely to be challenging for insurance companies.	Limited continuity of WII products after completion of project	Insurance companies will gain the experience and knowledge to adopt and adapt the WII to new crops and data because they will be implicated in the design. Also, there is ample budget and time to train insurance agents on the WII product and to obtain feedback	Operational, Financial	P = 3 I = 4				

#	Description of the risk	Potential consequence	Countermeasures / Mngt response	Type (Risk category) Environmental Financial Operational Organizational Political Regulatory Strategic Other	Probability & Impact (1-5, low to high)	Owner	Submitte dupdated by	Last Updat e	Statu s
	Consequently, they will not have the experience and knowledge to adapt the product to new crops and data		from rain-fed farmers and pastoralists. Legal and regulatory frameworks will also be adapted to facilitate the development and delivery of WII.						
	High upfront costs in developing WII may not be cost-effective and can lead others towards cheaper traditional forms of micro-insurance	Technical difficulty and costs affects ease of scaling-up	In the long-run, index insurance is less expensive to the administrator because there are no on-site inspections or individual loss assessments to perform. (Payout is based on an independent and exogenous weather paramter.) Scaling-up in terms of policy-holders will be supported by first pilot testing the WWI product. Insurance costs become minimized over time through planning of optimal (adaptation oriented) inputs and as yields rise.	Operational, Strategic, Financial	P = 3 I = 4				
	Targeted farmers and pastoralists are	There is limited uptake of WII	The project will invest resources in familiarizing the	Operational	P = 2 I = 3				

#	Description of the risk	Potential consequence	Countermeasures / Mngt response	Type (Risk category) Environmental Financial Operational Organizational Political Regulatory Strategic Other	Probability & Impact (1-5, low to high)	Owner	Submitte dupdated by	Last Updat e	Statu s
	sceptical and unwilling to engage into the index-insurance scheme	products and a potential waste of financial resources	target community with index-insurance that will be designed in a way that is affordable to the target community. The beneficiaries will be more willing to accept the insurance products because the regulatory framework for compensation criteria will be updated so that compensation can become clear and streamlined.						
	Limited reinsurance companies willing to back high-risk small holder rain-fed farmers and pastoralists	WII products cannot be successfully implemented without the support of international markets to offload risks	Experience through the Connect the Farmers to Market (CFM) project has shown that small holder rain-fed farmers can be effectively provided insurance and backed by reinsurance providers. The LDCF project will be building a formalized partnership with the CFM project, incorporating their lessons learned, and designing MF-MI products (e.g., WII)	Operational, Financial	P = 1 I = 3				

#	Description of the risk	Potential consequence	Countermeasures / Mngt response	Type (Risk category) Environmental Financial Operational Organizational Political Regulatory Strategic Other	Probability & Impact (1-5, low to high)	Owner	Submitte dupdated by	Last Updat e	Statu s
			which will reduce the risks for insurers due to the mandated adoption of CC adaptation technologies by beneficiaries						
	Delay for insurance compensation which could hinder next year harvests	Farmers will be unable to subsist in a changing climate without sufficient capital thereby making them more vulnerable to climate change	The WII regulations and legal frameworks geared towards farmers and pastoralists will be reviewed and revised so that compensation criteria are clear and compensation is streamlined	Operational, Strategic	P = 1 I = 3				
	The existence of other informal rural credit programmes which provide more flexibility but which are not linked to adaptation	Informal lenders hinder the uptake of MF products because they act as competition	Informal microfinance is practiced by local merchants and community members. Informal loans are small in quantity and scale because lenders generally receive personal guarantees rather than real collaterals. As such, informal loans are not geared to assist large populations nor to assist in cases of dispute or non-repayment due to the	Operational, Strategic, Financial	P = 3 I = 3				

#	Description of the risk	Potential consequence	Countermeasures / Mngt response	Type (Risk category) Environmental Financial Operational Organizational Political Regulatory Strategic Other	Probability & Impact (1-5, low to high)	Owner	Submitted dupdated by	Last Update	Status
			absence of a legal framework. This project will provide the legal and regulatory frameworks to have flexible and tailored loan products and will be able to serve larger populations. Most importantly, the new loans are likely to get better returns because the loans will be linked with adaptation technologies.						
	Limited comprehension of weather/climate information and agricultural advisories	Limited resilience building for SRFP	SMA has experience in providing forecasts to the farmers. Extension Services will be used to simplify and translate all messages into simplified and local languages for each target state	Operational	P = 2 I = 2				

Annex 2: Procurement Plan

During the first year of the project, licenses for high resolution satellite images for RSA and for hydrological and forecasting models for MoWRE and SMA must be renewed (Activities 1.1.2, 1.1.3, 1.2.2, see right column of the Work Plan below). Also, the first year will include the first tranche of procurement for weather stations, rain gauges and flow meters (Activities 1.1.1 and 1.2.1). Procurement will be staggered in order to have sufficient staff; some staff to maintain operations at SMA and MoWRE and remaining staff to install new monitoring equipment. Procurement will be managed by SMA and MoWRE who have sufficient experience in purchasing new equipment. As evidenced by SMA's self-financed ***Vaisala*** project and MoWRE's ***ENTRO*** project (see Section 2.4.1) which both included significant equipment procurement, both agencies have the appropriate systems in place to procure the goods/services indicated in the activities in the Work Plan below. If any additional services are needed (e.g., manufacturer selection, preparation and management of procurement contracts, purchase order assistance), SMA/MoWRE will request UNDP for assistance prior to project implementation. UNDP's costs for procurement assistance will count as Direct Project Costs and taken out of the Project Management budget.

Climate Risk Finance Workplan

	2014 yr1				2015 yr2				2016 yr3				2017 yr4				2018
Project Outcome/Atlas Activity	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**
OUTCOME 1: Institutional and technical capacity for climate observation, forecasting and early warning strengthened at national and local levels																	
Activity 1.1.1 Procurement of 8 water level meters to be placed, 3 manual, hydrological stations and 2 acoustic Doppler flow meters (ADCP) for (MOWRE)	**42,400**				**42,400**				**42,400**				**42,400**				**10,400**
Activity 1.1.2 Purchase of high resolution remote sensing data for RSA and MOWRE to provide a hydrological baseline in terms of delineating the drainage network and mapping agricultural and rangeland areas	**12,500**				**12,500**												
Activity 1.1.3 Renewal and purchase of hydrological modelling licenses of hydromet software including training for nine (9) engineers with modelling software (RSM, SMA, MOWRE)	**10,000**																
Activity 1.1.4 Purchase of CB radios, 200 mobile phones and SMS communication services to enable fast transmission of manually collected hydrological data	**4,700**				**4,700**				**4,700**				**4,700**				**1,200**
Activity 1.1.5 Knowledge sharing between RSA, SMA and MOWRE on hydrological modellings	**2,400**				**2,400**				**2,400**				**2,400**				**400**

Activity 1.1.6 Digitization of written hydrological/meteorological/climate/agricultural data for data rescue purposes and to facilitate the generation of climate predictions, weather forecasts and agricultural advisories (RSA, SMA MOWRE, ARC)	**4,700**	**4,700**	**4,700**	**4,700**	**1,200**
Activity 1.1.7 Training for of at least 10 MOWRI engineers, 4 SMA engineers and 3 RSA engineers on flow meter calibration in wadis and soil infiltration rate measurements	**4,700**	**4,700**	**4,700**	**4,700**	**1,200**
Activity 1.2.1 Procurement and installation of 7 automatic climate stations 6 automatic synoptic stations with telemetry and 162 rain gauges	**133,200**	**133,200**	**133,200**	**133,200**	**33,200**
Activity 1.2.2 Purchase of high resolution remote sensing data (e.g., less than 2 km resolution) and renewal of licenses	**140,000**	**140,000**			
Activity 1.2.3 Validation of soil and land cover / use satellite images using field observations to serve weather index and insurance needs		**10,000**	**10,000**	**10,000**	
Activity 1.2.4 Training for 12 engineers / 8 technicians within SMA on new automatic climate and synoptic stations	**4,700**	**4,700**	**4,700**	**4,700**	**1,200**
Activity 1.2.5 Training in satellite-based crop and drought monitoring for 2 RSA technicians and 3 RSA specialists		**5,000**	**10,000**	**5,000**	
Activity 1.2.6 Knowledge transfer between Sudan NHMS (RSA, SMA, MOWRE and the Ministry of Agriculture) and regional and international agencies on vegetation and drought monitoring	**3,500**	**3,500**	**3,500**	**3,500**	**1,000**
Activity 1.2.7 License renewal for the TAMSAT product including training by an expert on Cold Cloud Duration to effectively use satellite images to determine rainfall estimates	**12,500**	**12,500**			
Activity 1.2.8 Revitalization of the Water Satisfaction Index project			**7,500**	**7,500**	
Activity 1.3.1 Capacity reinforcement for SMA to produce forecasts (on hourly, daily and seasonal timescales for nowcasting, daily/weekly forecasts and seasonal forecasts) is strengthened by training 8 meteorologists and 12 specialized technicians	**4,700**	**4,700**	**4,700**	**4,700**	**1,200**
Activity 1.3.2 Formalized coordination with the DRR project National Early Warning Committee to ensure forecast bulletin or alert information is provided	**2,400**	**2,400**	**2,400**	**2,400**	**400**

Activity 1.3.3 Revitalization of targeted seasonal forecast by training local focal points	5,000	5,000				
Activity 1.3.4 Capacity reinforcement by a National financial expert on long-term sustainble budgeting and establishing sustainable cost-recovery mechanisms with revenues generated from selling tailored weather/climate products and risk maps					30,000	5,000
Activity 1.3.5 Establishment of a farm information management system		10,000		20,000	10,000	
Activity 1.3.6 Purchase and training on LEAP			15,000	15,000		
Activity 1.3.7 Incorporation of space-based information into Sudan's EWS	4,700	4,700		4,700	4,700	1,200
Activity 1.3.8 Rapid surveys of targeted users of climate information conducted to understand the social and economic costs and benefits of using advisories and warnings to mitigate risks				20,000	20,000	5,000
Activity 1.4.1 Development of a standardized communication operation procedure (SOP) by HAC involving all EWS agencies and grassroots NGOs	5,000	5,000				
Activity 1.4.2 Development of a mobile-phone partnership between SMA, ARC, extension service representatives and a mobile phone company so that rain-fed farmers and pastoralists can receive forecast/climate information and risk / agricultural / pest / livestock advisories by SMS				15,000	15,000	10,000
Activity 1.4.3 Implementation of a formalized feedback mechanism from beneficiaries to NHMS/ARC on the utility of alerts, weather/climate info/forecasts/predictions and agricultural advisories	5,600	5,600		5,600	5,600	1,600
Activity 1.4.4 A public awareness campaign in each of the vulnerable agro-ecological states to promote the utility of climate information and the Early Warning System for adaptation to climate change	5,000	5,000				
OUTCOME 2: Residual climate risk to rural livelihoods in the states of greatest rainfall variability addressed through parametric insurance products						
Activity 2.1.1 Feasibility assessment over 3.5 months to test the viability of an insurance scheme	50,000					

Activity 2.1.2 Study on how to improve delivery of inputs including local distribution of drought resistant seeds and link credit and lending to activities which support building resilience and adaptation to climate change	**20,000**					
Activity 2.1.3 Field validation to see if the farmers get their inputs on time and if/how they are being delivered in order to develop insurance premiums		**20,000**				
Activity 2.2.1 Study on demand of pastoralists for microfinance and insurance	**70,000**		**70,000**			
Activity 2.2.2 Design of at least 6 tailored weather index insurance products, based on the livelihoods in the 6 target zones	**54,100**		**54,100**	**54,100**	**54,100**	**13,600**
Activity 2.3.3 Development of a nationally based WII marketing and development team associated with the WII international specialist organization	**49,400**		**49,400**	**49,400**	**49,400**	**12,400**
Activity 2.2.4 Identification of farmers and pastoralists willing to participate in WII schemes and to accept the conditions of the loans	**4,700**		**4,700**	**4,700**	**4,700**	**1,200**
Activity 2.2.5 Training for local insurers and local brokers to enable them to adapt and underwrite weather index insurance contracts	**27,800**		**27,800**	**27,800**	**27,800**	**6,800**
Activity 2.2.6 Training for the Internal Sharia compliant committee so that the loan approval process can be decreased from up to 4 months to a period of one week		**15,000**	**15,000**			
Activity 2.2.7 Development of guidelines and manuals for approved products	**9,400**		**9,400**	**9,400**	**9,400**	**2,400**
Activity 2.2.8 Purchase of an Cloud secure data service for RSA, SMA MOWRE, ARC, the Ministry of Agriculture, the Ministry of Livestock, HAC and MFIs/Insurance companies to access flow, meteorological, climate and satellite image data	**40,000**					
Activity 2.2.9 Transfer of data into the Cloud data server to serve as a national weather databank	**4,700**		**4,700**	**4,700**	**4,700**	**1,200**
Activity 2.2.10 Facilitation of data sharing between all institutions managing hydro-meteorological equipment and MFIs/Insurance companies	**4,700**		**4,700**	**4,700**	**4,700**	**1,200**
Activity 2.2.11 Development of a toll-free number complaints service to assist SRFPs in the event of dispute				**15,000**	**15,000**	

Activity 2.2.12 Study tour to a south-south cooperative country (e.g., India or Pakistan) to understand and see a mature		**20,000**	**20,000**					
Activity 2.3.1 Development of an outreach strategy with a two-day workshop with key distribution Stakeholders such as banks/MFIs and cooperatives				**36,000**				
Activity 2.3.2 Production of training syllabus on the WII products, specific to each livelihood zone				**46,000**				
Activity 2.3.3 Public awareness campaign (by insurance representatives and humanitarian organizations (e.g., Practical Action)) to provide awareness and education on the utility and importance of agricultural insurance services for Farmers and Pastoralists Trade Unions						**25,000**	**25,000**	**10,000**
Activity 2.3.4 One-week training for 4 regional insurance focal points on weather index based insurance in each state	**20,200**			**20,200**		**20,200**	**20,200**	**5,200**
Activity 2.3.5 Series of training courses led by the TOTs in each implementation zone for farmer cooperatives, extension officers and lead farmers	**26,100**			**26,100**		**26,100**	**26,100**	**6,600**
Activity 2.3.6 Increase in the number of market outlets and insurance agents in the rural areas to disseminate insurance awareness and deliver services, including by the development of mobile banking/insurance services	**28,200**			**28,200**		**28,200**	**28,200**	**7,200**
Activity 2.3.7 Monitoring and Evaluation	**34,400**			**34,400**		**34,400**	**34,400**	**8,400**
Activity 2.4.1 Training by a WII specialist with regulators and policy makers in order to develop a suitable legal, regulatory and policy environment for WII	**36,000**							
Activity 2.4.2 Development of a white paper detailing recommendations for changes or additions to existing legislation		**20,000**						
Activity 2.4.3 Framework workshops with regulators and policy makers to set out the next steps for drafting a suitable weather index insurance regulatory document				**40,000**				
Activity 2.4.4 Creation of regulatory policy document to set out the types of Sharia-compliant products that may be developed and include a robust dispute resolution process				**30,000**				
Activity 2.4.5 Implementation of regulatory scheme in accordance with the laws of Sudan				**66,000**				

Activity 2.4.6 Development of partnerships with projects which can facilitate the link between micro-finance and micro-insurance and savings (e.g., ABSUMI project) and with partners who can facilitate outreach to SRFPs	**4,700**		**4,700**	**4,700**	**4,700**	**1,200**
Activity 2.4.7 International reinsurance company agreement secured to share/transfer catastrophic risks under the condition of traditional farming and livestock production			**10,000**	**10,000**		
Activity 2.4.8 Development of clear criteria for compensation regarding risks including rainfall thresholds per state		**10,000**	**10,000**			
Activity 2.4.9 Environmental Impact Assessment	**15,000**					

OUTCOME 3: Improved access of vulnerable farmers and pastoralists to financial services for climate change adaptation and disaster risk reduction					
Activity 3.1.1 Organization, centralization and promotion of lessons learned on best agricultural/pastoral practices	**17,000**	**17,000**			
Activity 3.1.2 Identification, documentation and promotion of proven adaptation crop and livestock production technology packages through on-farm validation	**12,000**	**12,000**	**12,000**	**12,000**	**2,900**
Activity 3.1.3 Assessment of previous experiences, design and development of an effective agro-advisory service to assist MF/MI and ensure the added value of adaptation technologies for risk minimization	**17,000**	**17,000**			
Activity 3.1.4 Rectify and improve the existing technology transfer programs to disseminate proven technology packages to agro-pastoralists through their groups/associations/organizations and inform them how micro-finance can be used to support the acquisition of adaptation technologies	**11,300**	**11,300**	**11,300**	**11,300**	**3,000**
Activity 3.1.5 Capacity building and institutional support targeting adaptation technology development and transfer	**8,000**	**8,000**	**8,000**	**8,000**	**2,000**

Activity 3.1.6 Preparation of technical manuals detailing sustainable agricultural and pastoral activities for year round cultivation and production of milk/meat products to be distributed to rain-fed farmers and pastoralists	**34,000**				
Activity 3.1.7 Review the Agricultural Bank of Sudan's previous experience with mobile banking and develop an improved mobile banking service to provide microfinance services to rain-fed pastoralists and farmers in the target states	**8,000**	**8,000**	**8,000**	**8,000**	**2,000**
Activity 3.1.8 Development of pastoral GPS tracking and mobile-phone based risk advisory services geared towards pastoralists		**8,500**	**17,000**	**8,500**	
Activity 3.1.9 Capacity building for ARC on crop/livestock-rangeland monitoring, scenario production and Decision Support Systems to be integrated into MF/WII products)	**34,000**				
Activity 3.1.10 Formalization of community-driven adaptation plans into Sudan's Five-Year Plan (2017-2021)			**17,000**		
Activity 3.2.1 Assessment of regulatory frameworks that control access of small producers in the rain-fed sector to microfinance services and unification of regulations among banks	**17,000**				
Activity 3.2.2 Obtain LoAs from all involved banks and microfinance institutions to adhere to the improved and unified regulations		**25,500**			
Activity 3.2.3 Awareness raising of agro-pastoralists in the targeted areas on the new regulatory framework		**27,900**	**27,000**	**27,000**	

Activity 3.2.4 Mandating the adoption of proven, climate change adaptation technologies as a prerequisite for obtaining access to credit and micro insurance services		**25,500**			
Activity 3.2.5 Development of rules and regulations to bundle microfinance and WII	**17,000**	**17,000**			
Activity 3.2.6 National level Coordination, M&E and Finance Support	**46,400**	**46,400**	**46,400**	**46,400**	**11,600**
Activity 3.3.1 Design and testing of loan products for adaptation farming and livestock production		**51,000**	**51,000**	**50,800**	
Activity 3.3.2 Promotion of loan products among the established farmers associations participating in the project		**10,000**	**20,000**	**10,000**	**900**
Activity 3.3.3 Design a monitoring system for the newly designed loan products and train microfinance providers on the system	**37,300**	**37,300**	**37,300**	**37,300**	**9,200**
Activity 3.3.4 Start delivery of the newly designed and tested products to agro-pastoralists through the partner microfinance providers utilizing appropriate means for loan delivery		**10,000**	**10,000**	**5,000**	**500**
Activity 3.3.5 Gender (e.g., youth, women) focused training to inform rain-fed farmers and pastoralists on MF/WII and climate change adaptation technologies	**16,000**	**16,000**	**16,000**	**16,000**	**3,900**
Activity 3.3.6 Long-term and periodic monitoring and assessment of adaptation-oriented microfinance performance and improvement of loan products and systems based on the annual assessment results	**15,100**	**15,100**	**15,100**	**15,100**	**3,600**
Activity 3.4.1 Capacity development for the Agricultural Extension and Technology Transfer Administrations (AETTA) in the targeted localities to organize farmers in groups and associations	**20,000**	**20,000**	**20,000**	**20,000**	**4,900**

Activity 3.4.2 Organization of SRFP in the projected targeted localities where they were not organized to form SRFP associations	**20,000**	**20,000**	**20,000**	**20,000**	**4,900**
Activity 3.4.3 Design of a simple and appropriate financial services management manual for SRFP groups/associations		**33,950**	**33,950**		
Activity 3.4.4 Training for Trainer of Trainers (TOTs) and the relevant staff of (AETTA) in the targeted localities on the agro pastoralist associations' financial services management manual		**40,000**	**20,000**	**16,400**	
Activity 3.4.5 Capacity development for existing and newly formed SRFP associations on the financial services management manual		**50,000**	**30,000**	**21,800**	
Activity 3.4.6 State level Coordination and M&E	**80,800**	**80,800**	**80,800**	**80,800**	**20,200**

Annex 3: Letters of Agreement (Co-financing)

بسم الله الرحمن الرحيم

Republi of Sudan
Ministry of Environment, Forestry & Physical Development
Higher Council for Environment & Natural Resources
General Secretariat

HCENR

جمهورية السودان
وزارة البيئة والغابات والتنمية العمرانية
المجلس الأعلى للبيئة والموارد الطبيعية
الأمانة العامة

Date : 30.10.2013

To: Resident Representative

UNDP – Khartoum

Subject: *Co - financing / Contribution Letters*

Dear Sir;

The Higher Council for Environment and Natural Resources (HCENR) has received co - financing / commitment letters to the project document: *Climate Risk Finance for Sustainable and Climate Resilient Rainfed Farming and Pastoral Systems*. Letters were received from the six targeted States (Gedarif, Kassala, River Nile, North Kordofan, White Nile and South Darfur) and from Sudan Meteorology Authority (SMA) in support of the implementation cost of the project.

Each of the States mentioned above is committed to contribute the equivalent of US $ 500,000 in kind (office space, staff contribution and logistical support).

In addition to the above, the in-kind contribution / commitment of the SMA is US $ 2,000,000. This includes staff, office space, weather observation stations and logistical support.

The HCENR, being the implementing partner, is also committed in kind contribution equivalent to US $ 1,000,000 by providing offices to the implementation unit, supervision, and access to library, consultations and logistical support.

Thanks and best Regards.

Prof. Haider Elsafi Mohamed Ali Shapo.
Acting Secretary General

30.10.2013

هاتف : ٧٨٤٢٧٩ - ١٨٣ - ٢٤٩+ فاكس : ٧٨٧٦١٧ - ١٨٣ - ٢٤٩+ ص . ب : ١٠٤٨٨ الخرطوم
Tel. : +249 - 183 - 784279 Fax : +249 - 183 - 787617 P.O. Box : 10488 - Khartoum
E-mail :hcenr@sudanmail.net hcenr2005@yahoo.com

بسم الله الرحمن الرحيم

البنك الزراعي السوداني
THE AGRICULTURAL BANK OF SUDAN

٥٠ عاماً من العطاء المتواصل في خدمة الاقتصاد السوداني

Date: 16/December 2013

NO:1/1/1/12

To: Secretary General of the Higher Council for the Environment and Natural Resources – Khartoum

Re: **Co-financing in support of the Implementation of the climate Risk Finance for Sustainable and climate Resilient farming and pastoral Systems project**

Dear Sir/Madame,

This letter is to confirm the support and commitment of the Agricultural Bank of Sudan (ABS) in the implementation of the climate Risk Finance for Sustainable and Climate Resilient Rainefed Farming and pastoral Systems project funded by GEF-LDCF.

The Agricultural Bank of Sudan Microfinance Initiative (ABSUMI) has been providing rural women access to microfinance since 2010. Experiences and outreach capacity from the ABSUMI initiative will directly support the development of microfinance and weather Index-based Insurance as planned under the GEF-LDCF project .The overlap of the project regions will also support the GEF-LDCF project .The Agricultural Bank of Sudan has an outreach branches in all LDCF target states (namely, Gedarif, Kassala, River Nile, White Nile, North Kordofan and South Darfur) including ABSUMI microfinance units in the North Kordofan ,Blue Nile, White Nile and South Kordofan states.

ABSUMI`S support for the project will be contingent on the following conditions:-

a) Activities are implemented in secure, dispute-free and non-conflict areas (ABSUMI`S methodology requires continuous presence in the rural areas).

b) Availability of the required logistical and institutional support from the LDCF project (mainly mobility) in order to support ABSUMI activities .

c) IFAD No Objection because it is a main stakeholder in ABSUMI.

During the period 2014 – 2018 and in accordance with above conditions, ABSUMI will provide a total in-kind support of USD 7.000.000 as parallel finance to the Climate Risk Finance for Sustainable and Climate Resilient Rained farming and pastoral Systems project objectives.

Sincerely Yours

Salah Hassan Ahmed

General Manager

Tel: 83 - 779410 - 83 770150 Fax: 83 770150 - 83 779081
P. O. Box: 1363 E-mail: agri_bank@yahoo.com

United Nations Development Programme
Sudan Country Office

Empowered lives.
Resilient nations.

Ref.: UNDP/CD/13/1751

Date: 4 December 2013

Dear GEF Secretariat,

Subject: **Co-financing in Support of the Implementation of the *"Climate Risk Finance for Sustainable and Climate Resilient Rain-fed farming and Pastoral Systems"* project**

This letter is to confirm the support and commitment of the UNDP Sudan Country Office in the implementation of the Climate Risk Finance for Sustainable and Climate Resilient Rain-fed Farming and Pastoral Systems project funded by the GEF LDCF.

The UNDP Sudan has been supporting climate change, community development and microfinance projects for the past several years. Experiences and outreach capacity from these UNDP initiatives will directly support the development of microfinance and Weather Index-based Insurance as planned under the GEF LDCF project.

In this regard, I am pleased to confirm that UNDP Sudan will support the LDCF project with a cash contribution of USD 600,000. We look forward to implementing the project activities in early 2014 and having a fruitful and continued cooperation with the LDCF.

Sincerely,

Yvonne Helle
UNDP Country Director

GEF Secretariat
1818 H Street, NW, Mail Stop P4-400
Washington, DC 20433 USA

Copy to:

- Dr Babiker Abdalla Ibrahim
  Under Secretary – Ministry of Environment, Forests and Physical Development

- Prof. Haider Elsafi
  Secretary General, Higher Council for Environment and Natural Resources

UNDP compound, House 7, Block 5, Gama'a Avenue, P.O. Box: 913, Khartoum, Sudan,
Tel: +249 187120 000 / +249 187 122 222-Fax: +249 183 773 128 - Email: registry.sd@undp.org- www.sd.undp.org

بسم الله الرحمن الرحيم

Agricultural Research Corporation (ARC)

P.O Box 126, Wad Medani –Sudan
Phone: +249511843226
Fax: +249511843213
Email: arcexedirector@yahoo.com

Khartoum, 13 March 2014

Ms. Adriana Dinu
UNDP-GEF Officer-in-charge
304 East 45th St., 9th Floor, New York, NY, 10017 USA

Subject: Co-financing for the UNDP-GEF project **Climate risk finance for sustainable agricultural and pastoral systems in Sudan**

On behalf of the Agricultural Research Corporation (ARC), I am pleased to express my full endorsement and support of the Global Environment Facility (GEF) project on **Climate Risk finance for sustainable agricultural and pastoral systems in Sudan**(2014 – 2018) financed by the Least Developed Country Fund (LDCF). The project is fully in-line with ARC's objectives to promote and distribute adaptation technologies to rain-fed agro-pastoralists and pastoralists throughout Sudan.

The LDCF project will build on ARC's expertise in improving production technologies and will facilitate the distribution and adoption of approved technologies dealing with crop and livestock production through land preparation, irrigation, water harvesting, rangeland and pasture improvement, plant and animal nutrition, pest and disease control, and agricultural engineering. In return, the LDCF project will support ARC and Extension Departments in each of the 6 states to establish demonstration farms to exhibit the best practices of adaptation technologies for both crop and livestock production.

To demonstrate ARC's support for the LDCF project, we will be committing availability of technical and administrative staff, office space and associated requirements and in total may account to about USD 2000,000 (two million Dollars) as in-kind contribution towards the LDCF project for Outcome 3 (Improved access of vulnerable farmers and pastoralists to financial services for climate change adaptation and disaster risk reduction) over the period 2014 – 2018.

We thank you for your assistance and look forward to a fruitful collaboration in the future.

Yours Sincerely,

Professor Ibrahim El-Dukheri

DG-ARC

بسم الله الرحمن الرحيم

شركة شيكان للتأمين وإعادة التأمين المحدودة
SHIEKAN INSURANCE & REINSURANCE CO.LTD

العضو المنتدب
Managing Director

Date: 13 March 2014

NO: S I R C/M D/2014

Prf. Haider Elsafi Mohamed Ali

Acting Secretary General

Higher Council For Environment & Natural Resources

Ministry Of Environment Forestry & Physical Development

P.O.Box : 10488 – Khartoum

Dear Sir,

Subject: Co Financing Climate Risk Finance for Sustainable and Climate Resilient Rain fed Farming and Pastoral system

This has reference to your letter dated **12/03/2014** regarding the above .

Please be advised that our core business is to understand, manage and carry risk. Our main responsibility as an insurance company is to provide quality and reliable insurance products and services to mitigate risk .

We provide all classes of insurance including interalia general insurance, takaful insurance (life), medical insurance, domestic credit and microinsurance .

We serve our clients from the public and private sector through a network of over **70** branches and offices in all the states of Sudan .

We estimate our volume of business in the **6** states mentioned in your letter during the coming **5** years to approximately SDG 18 million .

We aim to reduce risk, develop innovative insurance solutions and contribute to environmental, social and economic sustainability . Within this context, we have already implemented innovative products for sustainable risk mitigation to cover small – sale farmers in rain fed and pastoral areas .

We assure you that we will continue to play our crucial role in enhancing the understanding of risk and ways it can be managed .

Thanking you,

Yours faithfully,

Salah El Din Musa Mohamed

Managing Director

عمارة شيكان للتأمين السوق العربي – الخرطوم – السودان – ص ب: ١٠٠٣٧ – تلفون: ٧٨١٦٥٦ (١٨٣) (٢٤٩ +) – فاكس: ٧٧٦٨٤٩ (١٨٣) (٢٤٩ +)
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United Nations Development Programme

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Resilient nations.

STANDARD LETTER OF AGREEMENT BETWEEN UNDP AND THE HIGHER COUNCIL FOR ENVIRONMENT AND NATURAL RESOURCES FOR THE PROVISION OF SUPPORT SERVICES

Under project "Climate risk financing for sustainable agricultural and pastoral systems in Sudan"

Excellency,

1. Reference is made to consultations between officials of the Higher Council for Environment and natural Resources (hereinafter referred to as "HCENR") and officials of UNDP with respect to the provision of support services by the UNDP country office for nationally managed programmes and projects. UNDP and the HCENR hereby agree that the UNDP country office may provide such support services at the request of the Government through its institution designated in the "Climate risk finance for sustainable agricultural and pastoral systems in Sudan", as described below.

2. The UNDP country office may provide support services for assistance with reporting requirements and direct payment. In providing such support services, the UNDP country office shall ensure that the capacity of the Government-designated institution is strengthened to enable it to carry out such activities directly. The costs incurred by the UNDP country office in providing such support services shall be recovered from the administrative budget of the office.

3. The UNDP country office may provide, at the request of the designated institution, the following support services for the activities of the project:

   a. Recruitment of the International consultants as per the Terms of Reference annexed to the document.
   b. Assist the government in procurement of EWS equipment's in terms of identifying manufacturer selection, preparation and management of procurement contracts, and purchase order assistance management, SMA/MoWRE will request UNDP for assistance prior to project implementation.
   c. Contracting companies to provide professional services as required (eg deployment of weather index based insurance
   d. Identify training institutions abroad and administer participation of trainees in training programmes as needed

4. The procurement of goods and services and the recruitment of International Consultants by the UNDP country office shall be in accordance with the UNDP regulations, rules, policies and procedures. Support services described in paragraph 3 above shall be detailed in an annex to the project document, in the form provided in the Attachment hereto. If the requirements for support services by the country office change during the life of a project, the annex to the project document is revised with the mutual agreement of the UNDP Resident Representative and the designated institution.

5. The relevant provisions of the UNDP Standard Basic Assistance Agreement with the Government of Sudan (the "SBAA"), including the provisions on liability and privileges and immunities, shall apply to the

provision of such support services. The HCENR shall retain overall responsibility for the nationally managed project through its designated institution. The responsibility of the UNDP country office for the provision of the support services described herein shall be limited to the provision of such support services detailed in the annex to the project document.

6. Any claim or dispute arising under or in connection with the provision of support services by the UNDP country office in accordance with this letter shall be handled pursuant to the relevant provisions of the SBAA.

7. The manner and method of cost-recovery by the UNDP country office in providing the support services described in paragraph 3 above shall be specified in the annex to the project document.

8. The UNDP country office shall submit progress reports on the support services provided and shall report on the costs reimbursed in providing such services, as may be required.

9. Any modification of the present arrangements shall be effected by mutual written agreement of the parties hereto.

10. If you are in agreement with the provisions set forth above, please sign and return to this office two signed copies of this letter. Upon your signature, this letter shall constitute an agreement between your Government and UNDP on the terms and conditions for the provision of support services by the UNDP country office for nationally managed programmes and projects.

Your sincerely,

_____
Signed on behalf of UNDP
Ali Al-Za'tari
Resident Representative

For the National Implementing Agency:
Prof. Haider Elsafi Mohamed Ali Shapo
Secretary General – Higher Council for Environment and Natural Resources

Attachment 1

DESCRIPTION OF UNDP COUNTRY OFFICE SUPPORT SERVICES

1. Reference is made to consultations between the Higher Council for Environment and Natural Resources, of the Government of Sudan and officials of UNDP with respect to the provision of support services by the UNDP country office for the nationally managed project "Climate risk financing for sustainable agricultural and pastoral systems in Sudan

2. In accordance with the provisions of the letter of agreement and the project document, the UNDP country office shall provide support services for the "Climate risk financing for sustainable agricultural and pastoral systems in Sudan" as described below.

   a. Recruitment of the International consultants as per the Terms of Reference annexed to the document.
   b. Assist the government in procurement of EWS equipment's in terms of identifying manufacturer selection, preparation and management of procurement contracts, and purchase order assistance management, SMA/MoWRE will request UNDP for assistance prior to project implementation.
   c. Contracting companies to provide professional services as required (eg deployment of weather index based insurance
   d. Identify training institutions abroad and administer participation of trainees in training programmes as needed

3. Support services to be provided:

Support services (insert description)	Schedule for the provision of the support services	Cost to UNDP of providing such support services (where appropriate)	Amount and method of reimbursement of UNDP (where appropriate)
Recruitment of the International consultants as per the Terms of Reference annexed to the document. Advertisement, Identification, selection and contracting of International consultants (including advertising, short-listing and recruitment)	June 2014 – Dec-2016	As per the pro-forma costs: o 110 days over 48 months of GS5 HR Assistant: $ 18,000	UNDP will directly charge the project upon receipt of request of services from the Implementing Partner (IP)
Services related to procurement (including but not limited to): Procurement of goods Procurement of services	Throughout project implementation when applicable	As per the pro-forma costs: o 180 days over 48 months of GS6 Procurement Associate:	As above

		$22,000 o 70 days over 48 months of NOB Procurement Manager: $ $ 18,000	
Services related to finance (including but not limited to): o Payments	Ongoing throughout implementation when applicable	As per the pro-forma costs: o 180 days over 48 months of GS6 Procurement Associate: $22,000 o 70 days over 48 months of NOB Procurement Manager: $ $ 18,000	As above
Services related administration of training needs (including but not limited to): o Identification of institutes o Travel authorization o Ticket requests (booking, purchasing, etc.) o F10 settlements o Asset management	Ongoing throughout implementation when applicable	As per the pro-forma costs: o 100 days over 48 months of GS6 Finance Associate: $ 20,000 o 53 days over 48 months of NOB Finance Manager: 12,000	As above
Services related to ICT (including but not limited to): o Email box maintenance o ICT and office equipment installation and	Ongoing throughout implementation when applicable	As per the pro-forma costs: o 26 days over 48 months of GS5 IT Assistant: $6,000	As above

maintenance o Internet channel use o Mobile telephony contracting and use		o 10 days over 48 months of GS7 IT Manager: $ 2,000	
Total		$ 126,000	

4. Description of functions and responsibilities of the parties involved:

UNDP will conduct the full process while the role of the Implementing Partner (IP) will be as Follows:

- The Implementing Partner will send a timetable for services requested annually/ updated quarterly
- The Implementing Partner will send the request to UNDP for the services enclosing the specifications or Terms of Reference required
- For Hiring CV: the IP representatives will be on the interview panel, or participate in CV review in case an interview is not scheduled

Annex 4: Terms of Reference

EXAMPLES OF TERMS OF REFERENCE FOR PROJECT DOCUMENT

A. Project Board

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

The Project Board (PB) shall comprise national and sub-national representatives to guide and oversee the project. The PB will be housed within HCENR and chaired by HCENR. The PB will convene annually to discuss project progress and approve annual work plans. The National Project Coordinator (NPC) Officer will be an ex officio member of PB responsible for taking minutes. Potential members of the Project Board are reviewed and recommended for approval during the PAC meeting. Representatives of other stakeholders can be included in the Board as appropriate.

The responsibilities of the PB will be to:

- Supervise and approve the annual work plans and short term expert requirements
- Supervise project activities through monitoring progress and approving annual reports
- Review and approve work plans, financial plans and reports
- Provide strategic advice to the implementing institutions to ensure the integration of project activities with national and sub-national sustainable development and climate resilience objectives.
- Ensure inter agency coordination and cross-sectorial dissemination of strategic findings
- Ensure full participation of stakeholders in project activities
- Assist with organization of project reviews and contracting consultancies under technical assistance
- Provide guidance to the National Project Manager.

B. National Project Manager

The National Project Manager will report to the Project Board (PB) and will lead the project team through the planning and delivery of the Project. The NPM will have the authority to run the project on a day-to-day basis on behalf of the Implementing Partners, within the constraints laid down by the Board. The National Project Manager's prime responsibility is to ensure that the project produces the results specified in the project document, to the required standard of quality and within the specified constraints of time and cost. The NPM will be responsible for financial management and disbursements, with accountability to the government and UNDP. The NPM will work closely with the Implementing Partner, HCENR. The NPM will be recruited

by HCENR. He/she will be supported by a National Project Coordinator, a Monitoring and Evaluation specialist and a Communications Expert. His/her salary and indemnities will be paid for by the project.

Responsibilities

- Ensuring effective partnership working between the sub-national implementing Bureaus and the participating national agencies.
- Managing human and financial resources in consultation with the NPC to achieve results in line with the outputs and activities outlined in the project document.
- Preparing detailed annual breakdowns of the work plan for all project objectives and preparation of quarterly work plans.
- Preparing quarterly status and financial reports for comments by the NPC.
- Leading the preparation and implementation of annual results-based work plans and logical frameworks as endorsed by the management.
- Liaison with related and parallel activities dealing with adaptation, early warning, MF/MI and with cooperating implementing Ministries and Bureaus.
- Monitoring project activities, including financial matters, and preparing monthly and quarterly progress reports, and organising monthly and quarterly progress reviews.
- Supporting the NPC to organise task team meetings and annual lesson learning conferences
- Coordinating the distribution of responsibilities amongst team members and organising the monitoring and tracking systems.
- Reporting and providing feedback on project strategies, activities, progress, and barriers to PB.
- Organising annual task team meetings to share knowledge and experiences and lesson learned.
- Facilitating Project Board meetings and documenting meeting minutes.

C. National Project Coordinator (NPC)

The HCENR will appoint a NPC who will be responsible for the overall administration, on behalf of HCENR, for the project. He/she will also support the NPM with oversight, coordination of activities and maintaining a liaison with UNDP. The NPC's salary will be provided by HCENR. The project will be responsible for paying the indemnities for the NPC.

The NPC will be located within HECNR and will be responsible for

- Oversight and coordination of implementation of project activities.
- Assist in recruitment and supervision of technical and training expertise as required for implementation of the project.
- Developing and maintaining close linkages with relevant sectorial government agencies, UNDP, NGOs, civil society, international organisations and implementing partners of the project.

- Coordinating the project team in carrying out their duties at an optimum level through ensuring efficient and effective resource utilization.
- Coordinating inputs into annual results-based work plans and logical frameworks as endorsed by the management.
- Coordinating inputs into all project reports as required (including Annual Project Reports, Inception Report, Quarterly Reports and the Terminal Report).
- Coordinating the establishment of sub-national project Task Teams.

D. Administrative and Financial Assistant

One administrative and financial assistant will report to NPC and will contracted by the HCENR. His/her responsibilities will be to:

- Set up and maintain project files and accounting systems whilst ensuring compatibility with Sudanese and UNDP financial accounting procedures.
- Prepare budget revisions of the project budgets and assist in the preparation of the annual work plans.
- Process payments requests for settlement purposes including quarterly advances to the implementing partners upon joint review.
- Update financial plans, prepare status reports, progress reports and other financial reports.
- 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.
- Collect and maintain project related information data and establish document control procedures.
- Administer Project Board meetings.
- Administer project revision control.
- Compile, copy and distribute all project reports.
- Provide support in the use of Atlas for monitoring and reporting.

E. Monitoring and Evaluation (M&E) Expert (National)

The M&E Expert will report to the NPM and will support the NPC, NPM and the State Technical Committees to prepare the relevant M&E systems required to monitor and assess quality of progress, to identify, collect, analyse, document and disseminate lessons learned through an annual project meeting, and support the preparation of project evidence for sharing (e.g., UNDP ALM). The M&E Expert will liaise with the Communication Specialist to prepare the data collection protocols to consistently collect data on project progress from project sites and its processing by the NPM for national reporting purposes with the assistance of NPC.

Responsibilities

- Establish the overall results-based M&E strategy in accordance with M&E plans outlined in the project document.
- Together with the Communication Specialist, design a system for collecting information on project lessons to be used in annual progress meetings.
- Develop data collection instruments, cognisant of the spatial data requirements advised by the Technical Support Board (see Section 5).
- Guide and coordinate the review of the project Strategic Results Framework, including:
    a. Provide technical advice for the revision of performance indicators.
    b. Identify sources of data, collection methods, who collects data, how often, cost of collection and who analyses the data.
    c. Facilitate annual review of risks by NPM.
- Prepare reporting formats and support NPM to prepare the required reports. Guide project task teams in preparing their progress reports in accordance with the approved reporting formats. This includes quarterly progress reports, annual project reports, inception reports, and ad-hoc technical reports.
- Foster participatory planning and monitoring by advising the training institutions on content for participatory monitoring and evaluation of activities.
- Assist the NPM to collate technical reports and other documents from the project and contribute to the ALM.

Qualifications Required

- Capacities in knowledge management and reporting
- Proven capacity in M&E for the UN system (ALM, UNDP Evaluation Resource Centre)
- Knowledge of microfinance, insurance and adaptation

F. Communication Specialist (National)

This Specialist will be required to have significant knowledge of microfinance and insurance. The role of the specialist will be to ensure public awareness of MF/WII products on State levels and to validate that training programmes and manuals are effective in building financial literacy (e.g., facilitating Training of Trainer workshops). He/she will also provide support in mobilizing and organizing farmers and pastoralists so that group lending can take place (thereby spreading risks) and will act as a liaison with state insurance agents and MFIs and NGOs. On a regular basis, the Specialist will provide a relay of information to the National Project Manager on what is successful or not working in each target State so that MF/WII products and their respective regulatory frameworks can be continually improved and targeted to smallholder rain-fed farmers and pastoralists.

The Communication Specialist will report to the NPM and will support the NPC, NPM and the State Technical Committees to conduct public awareness of MF/WII products on State levels and to validate that training programmes and manuals are effective in building financial literacy of SRFPs. The Communication Specialist will liaise with the M&E Expert to prepare the data collection protocols to consistently collect data on project progress from project sites and its processing by the NPM for national reporting purposes with the assistance of NPC.

Responsibilities

- Ensure public awareness and understanding of MF/WII products
- Facilitate Training of Trainer sessions
- Work with State Technical Committees on public awareness
- Conduct on-farm validation to ensure SRFP understand products
- Provide support in mobilizing and organizing farmers and pastoralists so that group lending can take place.
- Act as a liaison with state insurance agents and MFIs and NGOs.
- Provide a relay of information to the National Project Manager on what is successful or not working in each target State

Qualifications Required

- Knowledge of microfinance, insurance and adaptation
- Ability to conduct public awareness campaigns
- Proven capacity in communication on national and local levels
- Fluency in Arabic, knowledge of native languages in the 6 target states

G. Weather forecasting specialist (International Short Term)

The specialist will support the project by providing weather forecasting expertise on short timescales (daily). The specialist will train the relevant officials in the use and treatment of weather observation data, forecasting and establish specifications for down-scaling forecasts to be localized to the country's particular climate zones. They will help train SMA, RSA and MoWRE staff in the interpretation of weather risk and vulnerability scenarios for evaluating mitigation and mobilization efforts and will report to the Project Management Unit.

Responsibilities

- Prepare weather data specifications and data collection protocol.
- Review quality and utility of existing data and advice on additional data collection requirements and data rescue.
- Review Numerical Weather Prediction models and recommends best model(s) for country-use, considering the technical, financial and operating capacities of the Met Service
- Provide training specifications and protocol for Numerical Weather Prediction and forecast downscaling
- Focus predictions on the most pertinent extreme weather threats (floods, droughts)
- Set up collaboration with the Hydrological Services, MoWRE and RSA to ensure data sharing for extreme weather prediction (e.g., rainfall intensity measurement and soil moisture satellite data)
- Work with SMA/MoWRE/RSA to set-up criteria and Standard Operating Procedures to designate alert thresholds
- Prepare knowledge-exchange planning (financial estimate included) indicating which WMO continuing training opportunities should be exploited, both regionally and internationally

- Develop plan for how to deliver climate information to the insurance sector and other socio-economic sectors, including the development of climatic models for tailored applications (e.g., health)

H. Microfinance National Consultant

(1) Review the regulatory frameworks organizing delivery of financial services to small agro-pastoralists in the rain-fed sector:

With the participation of and in coordination with the partner microfinance providers the consultant will perform the following tasks:

- Review and assess the regulatory frameworks that control access of small producers in the rain-fed sector to microfinance services.
- Suggest improvements to service providers and unify the regulations among partner microfinance providers to enable small holders to access microcredit services for production and marketing on reasonable terms.
- Draft a letter of agreement to be signed by the partner providers showing their commitment to adhere to the improved and unified regulations. Before signing the LOA should be reviewed and approved by the banks and the project management.
- Assist the service providers and locality extension administrations participating in the Project to draft extension messages to raise awareness of agro-pastoralists in the targeted areas on the new regulatory framework intended to facilitate microcredit, insurance and savings services with the adoption of released adaptation technologies, approved by the National Variety, Husbandry, and Pest & Disease Release Committees.

(2) Design and test at least three flexible microfinance loan products for the adaptation technologies identified and approved for each state for adoption by the agro-pastoralists to account for pastoral mobility and income cycles of local farmers. Each product will specify appropriate loan size, prices, repayment schedules, and eligibility criteria geared toward rain-fed farmers and pastoralists and offered through financial service providers to increase resilience of farming and pastoral practices as prioritized in local adaptation plans.

- Design the loan products when in the first year of implementation would be tested with one farmers and pastoralists association in each state
- Assess the performance of the loan products after the first year of implementation. The assessment process should be participatory involving, providers, clients, and other relevant partners. The assessment result should be an improved design of the loan products regarding the different design features of each product.
- Design a monitoring system for the newly designed loan products and train microfinance provides on the system.
- Participate in the annual assessment of the Project interventions with the aim of assessing the loan products and improving their design to fit farmers needs in the different states and production systems.

(3) Develop the capacity agro-pastoralists associations in financial intermediation including the development of simple and appropriate financial service management manual and training them on how to apply it so that they can access financial services and climate change adaptation technologies:

- Design a simple and appropriate financial services management manual for agro-pastoralists groups/associations to build their institutional capacities in financial intermediation. The manual should include membership conditions, credit bylaws, loan products features to be delivered and conditions of access for members, a simple loan recording and accounting systems, delinquency management procedures etc.
- Conduct a Training of Trainers workshop (TOTs) in each state for the relevant staff of the Agricultural Extension and Technology Transfer Administration/Microfinance provides in the targeted localities on the agro pastoralist associations' financial services management manual to train agro-pastoralists committees on how to apply the financial services management manual.
- Conduct periodic supervision visits during the first year of implementation in each state to ensure that the manuals were being adopted appropriate

I. Information Technology and Business Development Specialist on Mobile-Phone Platforms (National Short Term)

Building resilience to extreme weather, climate change impact and food insecurity is a critical challenge in Sudan. By providing climate information and weather forecasts to farmers by mobile phone communication, the resilience of even the most vulnerable populations can be improved. To assist with climate information (CI) and early warning system (EWS) message dissemination, a specialist is required for 1 month to conduct market and technical research on how to link CI/EWS to mobile-phone platforms.

Responsibilities of the specialist must include:

- Working with cell phone providers, SMA, RSA, MoWRE, ARC, HAC and the Ministry of Agriculture to see how climate information and alerts can be provided most cost-effectively to the general public by SMS and voice messages
- Conducting market research on the needs of rain-fed farmers and pastoralists is needed at various times of year
- Developing a feasibility study on how Sudan can contribute climate information and alerts to existing mobile-phone platforms, for example, the CABI/Plantwise knowledge bank and other related initiatives
- Formulating a plan on how Sudan can best integrate the LDCF project with the Pilot Project on Climate Resilience (PPCR) and how to link with regional and international initiatives

J. Hydrological Modelling Specialist (International Short Term)

The hydrologist will work closely with MoWRE and RSA to develop hydrological modelling capacity for flood forecasting with MIKE BASIN software. The specialist must have expertise with watershed management and be able to integrate dam operations into models.

Responsibilities of the specialist must include:

- Consider the potential impacts of climate variability and change on water

- resources, as well as the uncertainties of the outputs of climatological models
- To provide advice on potential extreme floods and drought assessment, forecasting and warning
- To carry out an investigation of methods of PMP/PMF derivation and other
- methods for extreme flood estimation
- To provide best available practices and on national standards in estimation of hydrological design data for extreme floods occurrences
- To provide modelling simulations on the increase of water-stress during a period of drought and with a view to ensuring the proper management of water resources during such conditions
- To assess the needs for hydrological information, to contribute to the formulation of standards on measurements and data processing and to formulate proposals for integrated monitoring network design and assessment
- Calibration and testing of hydrological models using outputs from meteorological models, preferably in gridded form
- Developing flood and drought warning thresholds in collaboration with MoWRE/RSA/SMA

Qualifications Required

- A post graduate academic degree, preferably a PhD, in hydrology, flood management, or river basin management.
- He/she should have a minimum of ten years of varied experience in hydrology, water resources management and integrated water resources management
- The candidate should have an excellent understanding of watershed modelling and be well-acquainted with the concept and practice of integrated water management issues at trans-boundary river basin scales.
- The specialist should also have a solid knowledge of climate modelling and downscaling in order to use rainfall prediction for flood forecasting scenarios.
- He/she should be familiar with conventional and modern equipment and techniques for hydrological data collection, including up-to-date knowledge on remote sensing and data transmission technology.
- Excellent communication and writing skills in English are required

K. Adaptation Technology Specialists Team (National Short Term)

A team of national experts including an agronomist, a livestock-range land specialist, a climate change adaptation expert, and a technology transfer expert will work closely with ARC and the MoAg at the state level to identify the Best Adaptation Technologies to be offered with microfinance products.

Responsibilities of the team must include:

- Develop a Decision Support System (DSS) that considers the potential impacts of climate variability and change on adaptation technologies as well as the uncertainties of the outputs
- Provide advice on potential adaptation technologies, agro advisory based of the sessional and updated forecasts
- Supervise field demonstrations and validation plots for potential adaption technologies in all the target states

- Provide modeling simulations on productivity (crops/livestock) during a period of stress and climatic risks with a view to ensuring proper management practices during such conditions
- Assess the needs for response farming (climate smart farming), to contribute to the formulation of standards on measurements and data processing and to formulate proposals for integrated monitoring network design and assessment
- Calibrate and test production models (rain-fed/pastoral) using outputs from meteorological models to be integrated in the DSS
- Develop rain-fed/pastoral drought warning thresholds in collaboration with ARC and SMA

Qualifications Required

- A post graduate academic degree, preferably a PhD, in Agronomy/Agriculture/Livestock-Rangeland management, and Technology Transfer.
- Each one of the team should have a minimum of ten years of varied experience in Agronomy/Agriculture/Livestock-Rangeland, soil-water management, and Technology Transfer.
- At least one of the team should have an excellent understanding of crop modelling and well-acquainted with the concept and practice of integrated DSS
- At least one of the team should also have a good knowledge of climate modelling and downscaling in order to use rainfall prediction for crop modelling and DSS scenarios.
- Each one of the team should have excellent communication and writing skills in English (requirement)

J. Programme Manager for WII Product Development Team (Nationally-based)

The Country Project Manager is responsible for overseeing the general operations and country performance. A primary element of this responsibility is the development and implementation of a successful sales strategy and approach. Micro-insurance is an emerging industry in Sudan so the organisation must continue to set the standard for product innovation, business process acumen and service excellence. The Country Project Manager should develop the capacity and skills of the team and new hires to ensure effective delivery of services for new and existing business.

Success for the Country Project Manager will be defined by 1) ability to meet targets to deliver Weather Index Insurance across six products, and 2) development of a strong team of Sudanese professionals who can provide high quality, efficient service to partners and clients.

Key Responsibilities

I. Partner Relationship Management

- Establish and maintain excellent communication with front office partners and insurers
- With underwriting partners, design products in collaboration and negotiate terms based on the unique needs of underserved (low income) markets
- Capitalize on opportunities and address operational weaknesses with urgency and focus

- Work with regulators to ensure that compliance and regulatory requirements and managed and monitored effectively

II. Business Development

- Identify and capitalize on new opportunities for new partnerships with banks, microfinance institutions, NGOs, and other aggregators in the low-income sector
- Maximize opportunities to up-sell and cross-sell to existing partners, to drive revenue

III. Financial Management

- Develop a profitable Weather Index Insurance business, governed by outreach, revenue and profit targets agreed between Senior Management and the Country Project Manager
- Provide updated reports, forecasts and projections relating to the development of the business are required
- Develop business plans for long term growth and profitability of the Sudan business

IV. Operational Delivery

- Work with the Operations Director and head office Operations teams to establish and maintain an effective and efficient operation to handle processing of business and reporting of the results
- Ensure that Senior Management are informed as required of progress, risks and issues relating to operational and service delivery

V. Market Awareness

- Ensure a deep understanding of the insurance needs of the Weather Index Insurance market
- Anticipate opportunities in the marketplace by organizing market research efforts among current and potential clients
- Use research insights to deliver value in current products, identify new products, and make critical changes in operations and communication

VI. Public Relations

- Organize press events around key achievements, new partnerships and product launches
- Work with the Client Relations Manager to compile and distribute client outcome stories for publication within partner networks
- Ensure an excellent reputation for the organisation both within and beyond partner networks

VII. Team Leadership

- Provide strong leadership, mentoring and guidance to all of the team in Sudan
- Work with managers to set and manage priorities for the business
- Encourage a culture of continuous improvement and innovation
- Ensure that the team are motivated to perform effectively

Qualifications

- 4-year degree qualification required, Master's degree preferred

- 5-8 years' work experience preferred, with a demonstrated track record of achievement and increasing responsibility, although exceptional candidates may have shorter work tenure
- Strong business development, sales or marketing background and/or leadership ability, preferably with management experience
- Appreciation and concern for the plight of low-income Sudanese
- Ability to effectively present and sell concepts to senior managers in partner organizations who are often not familiar with insurance
- Ability to train staff members and low-income individuals in unfamiliar insurance concepts
- Demonstrated ability to develop business, sell concepts and close deals, preferably in Sudan
- Experience in developing new products and demonstrated understanding of market research techniques and competitor analysis
- Experience in working with low-income persons in professional or informal settings
- Knowledge of Sudanese financial services sector essential, knowledge of insurance preferred
- Ability to utilize contacts for new business opportunities
- Ability to perform business analysis by utilizing operational, financial and other data
- Willingness to work as a team member with people across geographies and cultures
- Strong self-starter able to perform tasks with minimal input
- Ability to work on the move approximately 30% of time, travel outside Khartoum 10% of time
- Fluency in spoken and written English essential
- Strong knowledge of and experience with Microsoft Office Suite, including Word, Excel and PowerPoint, including using these tools to present materials orally and in written form

Annex 5: References

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http://www.cgap.org/blog/reaching-small-farmers-through-innovative-finance-pakistan

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Vogel, Isabel, ***Review of the use of 'Theory of Change' in International Development*** Review Report, April 2012

Annex 6: Stakeholder Involvement Plan

248. The Stakeholders identified during project preparation will continue to be implicated in project implementation. A Stakeholder involvement plan has been created to provide a framework to guide interaction between implementing partners and the key stakeholders, particularly end-users to validate project progress. All Stakeholders involved in the baseline self-capacity assessment will be addressed again in order to track the efficacy of Stakeholder capacity building both operationally and technically. Also, the women's interest organizations, housed at Ahfad University will continue to be implicated and consulted in order to ensure women are properly engaged/warned. These gender-focused NGOs/CSOs will conduct the gender disaggregated survey indicating the receipt of alerts and adoption of financial services by women. Women groups established by and partnered with MFIs in addition to women agricultures associations who have been exposed to Training of Trainers programs in different areas will also be consulted.

249. During project development, key public participation Stakeholders including CSOs and indigenous people were identified. They will continue to be implicated during project implementation. Their expected roles are indicated in the following table.

Annex 6, Table 1: Stakeholder Involvement Matrix

Farmer's Trade Union in each State	- Identify the types of crops grown and the types of livestock raised and the production systems being followed by participating farmers - Select farmers who will be willing to collaborate to undertake technology field evaluation on his/her farm and provide an on-farm demonstration site to train other farmers in improved technologies and best practices - Facilitate the formation of Community Based Organizations to lead project implementation in the targeted village clusters - Participate in one or more Community Orientation/Mobilization meeting(s) in each of the villages - Participate in project planning for community level activities, focusing on agriculture - One representative from the Trade Union will be involved in the Technical Committee for each State
Pastoralist's Trade Union in each State	- Identify the types of livestock raised and the production systems being followed by participating pastoralists - Select pastoralists who will be willing to collaborate to undertake adaptation and dry-land technology field evaluations - Facilitate the formation of Community Based Organizations to lead project implementation in the targeted village clusters - Participate in one or more Community Orientation/Mobilization meeting(s) in each of the villages - Participate in project planning for community level activities, focusing on pastoralism - One representative from the Trade Union will be involved in the Technical Committee for each State
Practical Action	- Inform community members about the main aspects and implementation modalities of the Project, including the importance of community participation in all stages of the entire project development process - Discuss the project interactions and some of the linkages with other projects (e.g., the LDCF1 project or planned

	NAP initiatives) - Assess the community's interest to participate actively in the entire project development process and the willingness to become responsible for the implementation and management of the project development - Discuss the need to form a representative Community Based Organization.
Youth/Women Society Organizations (Women's Union of Kassala, Sudanese Youth Union)	- Facilitating the community participatory planning process to implement activities, focusing on the involvement of women and children - Establish community rules and regulations by which the community cooperatives receive and pay back borrowed money for different adaptation purposes - Support women's involvement in microfinance promoting awareness of successful national initiatives for women such as ABSUMI - Participate in gender-disaggregated assessments and site identifications for community adaptation interventions - Serve as a permanent focal point with the State Technical Committee - Nominate one gender focused representative to take part in each State Technical Committee
Sudanese Climate Change Network	- Review and test of community based early warning system strategies, DRR preparedness and adaptation options - Documentation of adaptation and DRR good practices and relevant local innovations - Conduct awareness sessions at different levels including with local farmers and pastoralist communities to raise their knowledge by the project objectives, linkages and how to maximize their benefits - Facilitate meteorological data collection and early warning dissemination to improve seasonal rainfall forecasts and climate services - Facilitate vulnerability assessments and baseline surveys at community levels using participatory approaches and methods - Conduct capacity building workshops at community levels on the use of weather/climate information agricultural advisories - Build good linkages with other related regional and international projects, interventions and NGOs organizations particularly Pan African for Climate Change justice Network (PACJA)
MASAR (pastoralist NGO)	- Facilitate project intervention in the targeted states for pastoralists regarding: o Formation of pastoral organizations o Identifying training needs / gaps o Planning adaptation measures o Facilitating access to microfinance o Supporting the study to determine the need and feasibility of WII for pastoralists

250. During implementation, the communication and consultation process will be divided into three main phases, being:

251. Phase 1 – Developing a strategy and action plan;

This is the mobilization phase in the first year of the project. The details of the activities and implementation structures will be designed, partnerships for action will be forged and stakeholder engagement will focus around these design processes.

252. Phase 2 – Consultation through implementation; and

This is the main implementation phase where investments will be made on the ground in the target areas and stakeholder consultation about engagement will focus on output oriented action.

253. Phase 3 – Project completion and scale up promotion.

The third and final phase represents the completion of the project. The plans for scale-up and long-term sustainability of the LDCF investments will be developed. Consultation will focus on learning, bringing experience together and looking at processes for continued post-project impact.

254. Specifically, in Phase 1, gender-focused NGOs/CSOs (housed at Ahfad University) will continue to be implicated and consulted in order to ensure women are properly engaged/warned. They will also conduct the gender disaggregated survey.

255. In Phase 2, public consultations will become more of an on-going exchange of information where there will be two main purposes:

- to gather information from beneficiaries and stakeholders about the impact and effectiveness of the planned adaptation packages and WII/MF products to support adaptive management; and
- to provide interested government and donor stakeholders and the general public with information about the progress and impact of the project as it is implemented.

256. Phase 3 will be a process of ensuring completion, hand-over and long-term sustainability of the LDCF investment. Consultation will focus on bringing experience together, sharing key lessons learnt (through the UNDP ALM and other forums) and looking at processes for promoting scale up of this project in order to provide access to weather/climate information/warnings and financial services for rain-fed farmers and pastoralists.

Overall the types of consultation mechanisms to be used include:

- Preparation meetings with NGOs/CSOs to be implicated in alert communication;
- Initial consultation meetings in target regions to discuss appropriate weather indices for WII insurance;
- Information briefings for government and co-financing institutions on WII and MF product development;
- Initiation of public awareness campaign on EWS, MF and WII products as well as appropriate adaptation technology packages

Annex 7: HACT analysis on the IP

To be provided by CO

Annex 8: MicroEnsure Pre-feasibility Report

Introducing Climate Risk Transfer Mechanisms – Index Insurance Pilot Scheme for Farmers and Pastoralists in Sudan

A Feasibility Study

September 2013

SEE PDF ATTACHMENT

Annex 9: Assessment Reports

9a) NAPA project locations

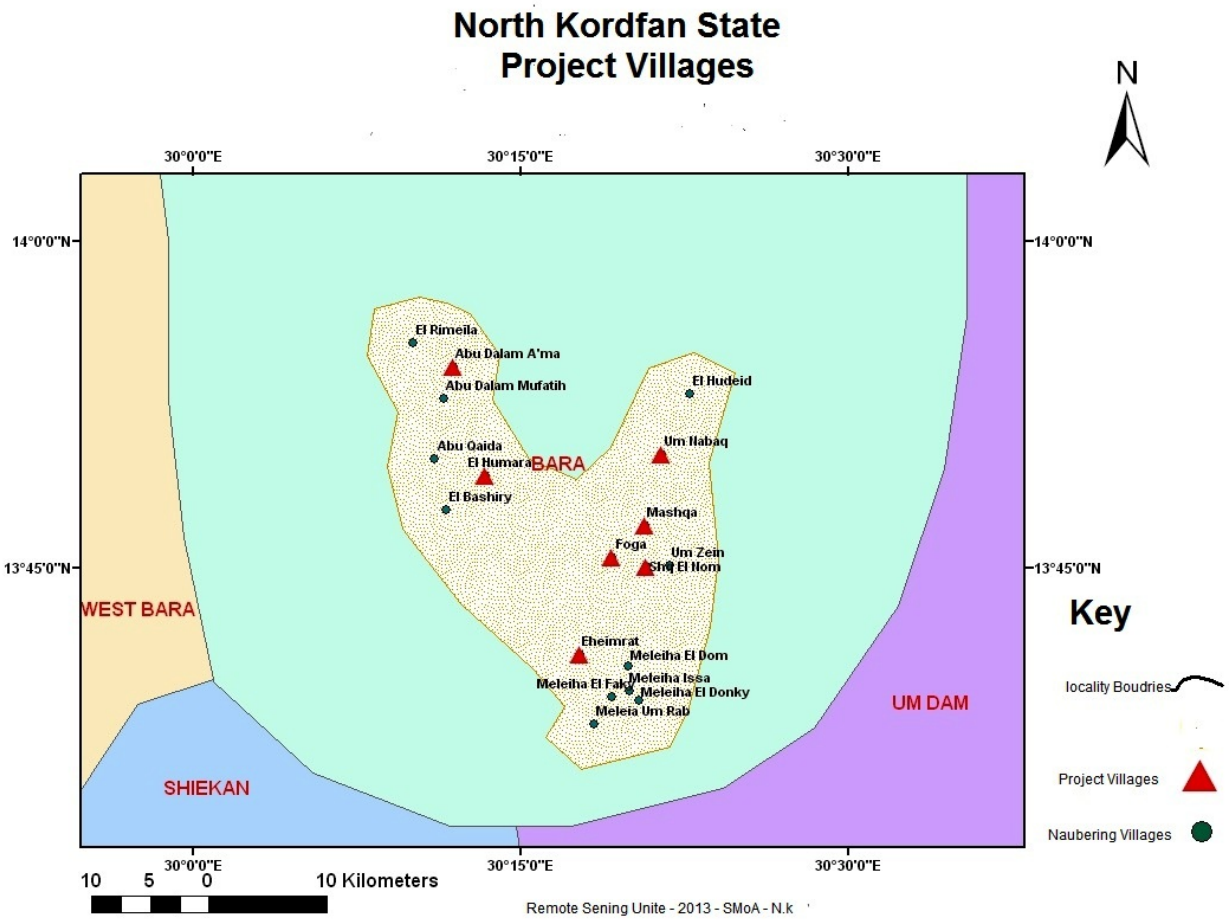


Figure 1a: North Kordofan State LDCF1 project interventions

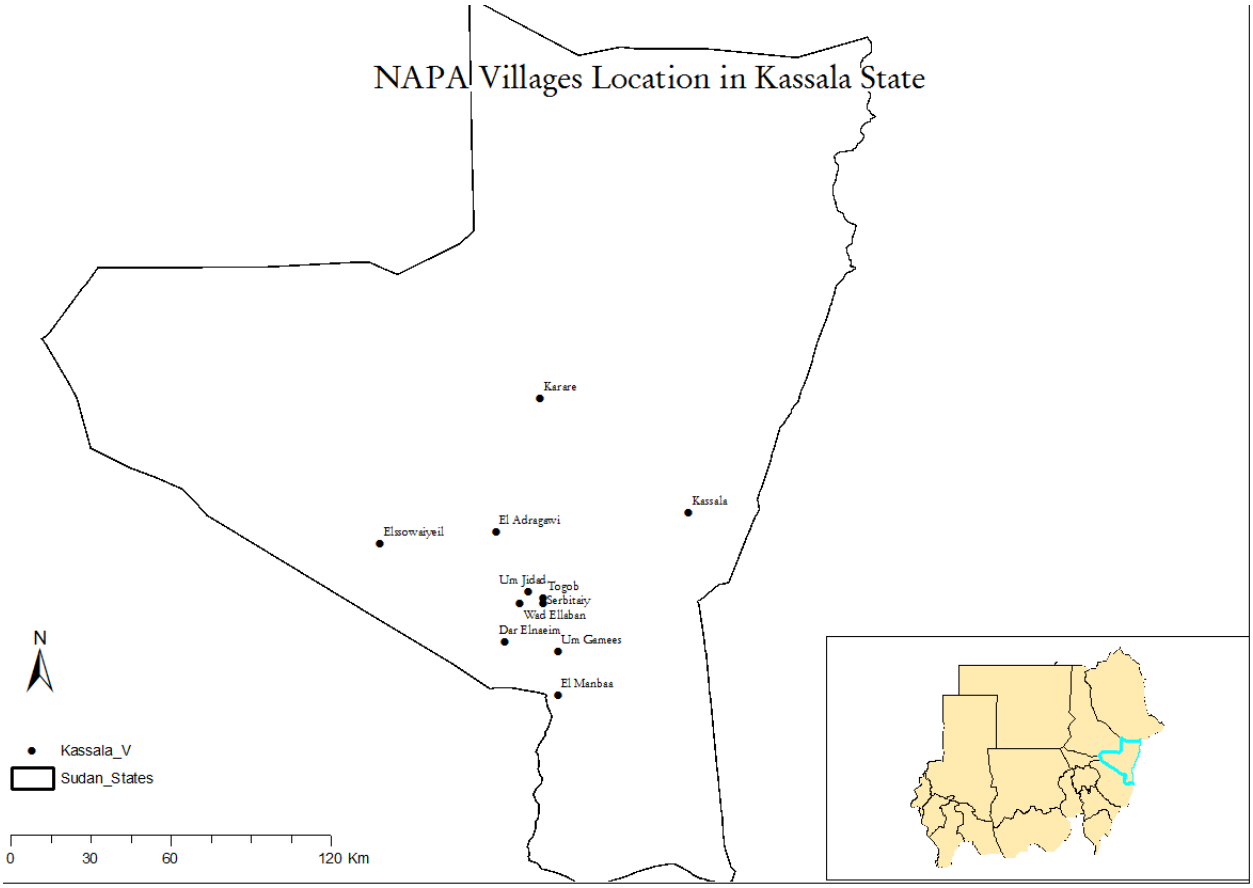


Figure 1b: Kassala State LDCF1 project interventions

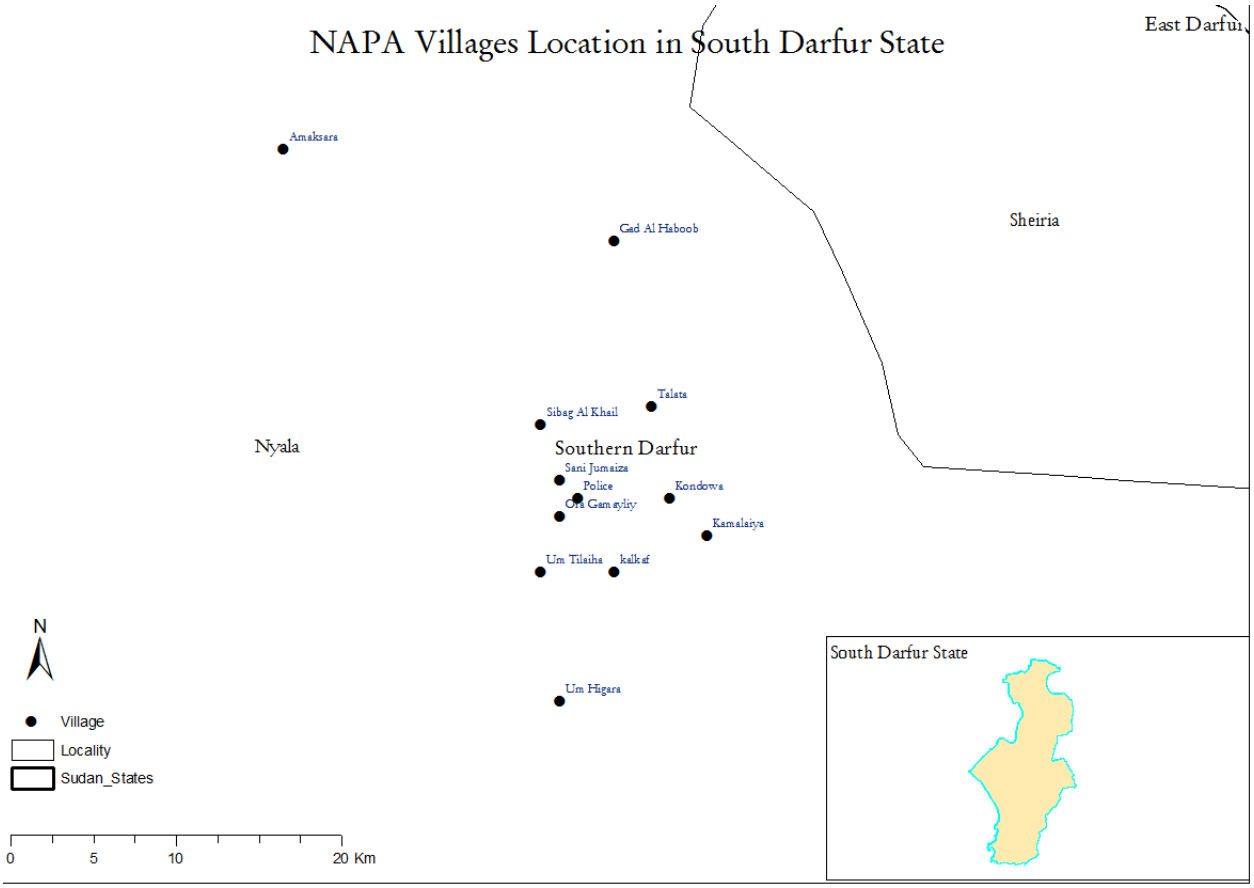


Figure 1c: South Darfur State LDCF1 project interventions

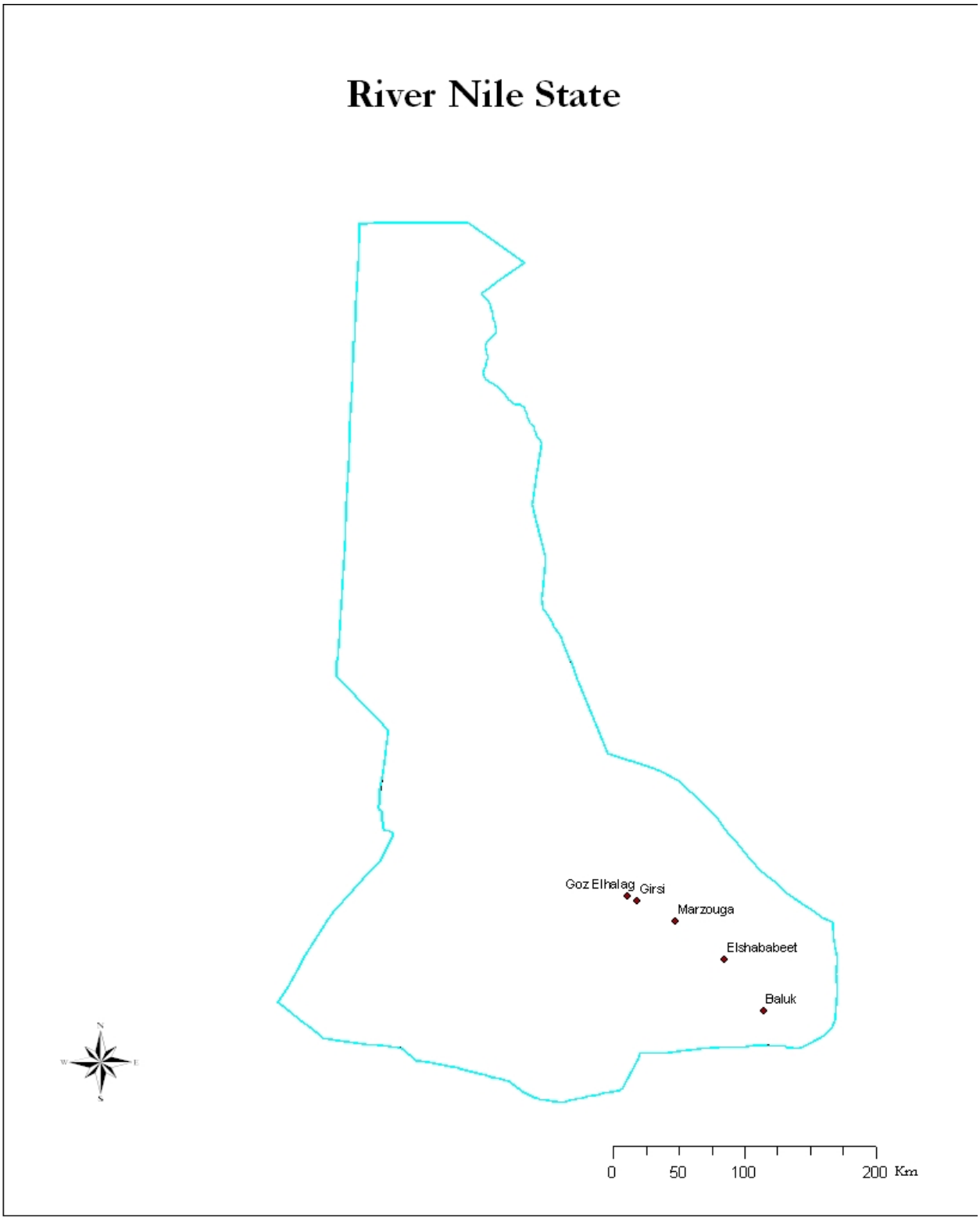


Figure 1d: River Nile State LDCF1 project interventions

9b) ENTRO REPORT (Ministry of Water Resources and Electricity)

Figure 2: Eastern Nile Regional Technical Office (ENTRO) Flood forecasting study and project location regions indicated by red shaded areas along rivers in Ethiopia, Sudan and Egypt

9c)

Sudan Meteorological Authority / Remote Sensing Authority Maps

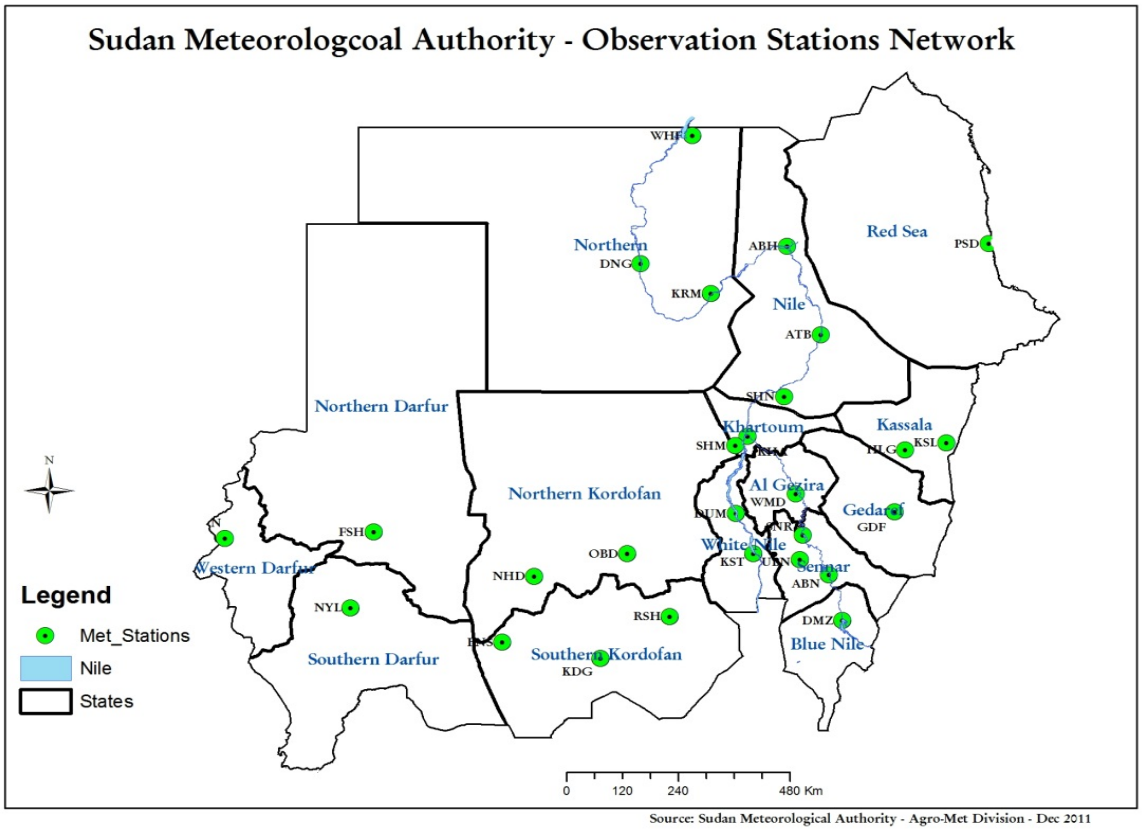


Figure 3: Location of the current operating weather stations

Table 1: Operating and silent rain gauges in the 6 target states

STATE	Operating rain gauges	Silent R/Gs to be revived
North Kordofan	39	48
White Nile	**2**	**15**
El Gedaref	14	14
Kassala	37	43
River Nile	4	9
South Darfour	2	33
The total	**98**	**162**

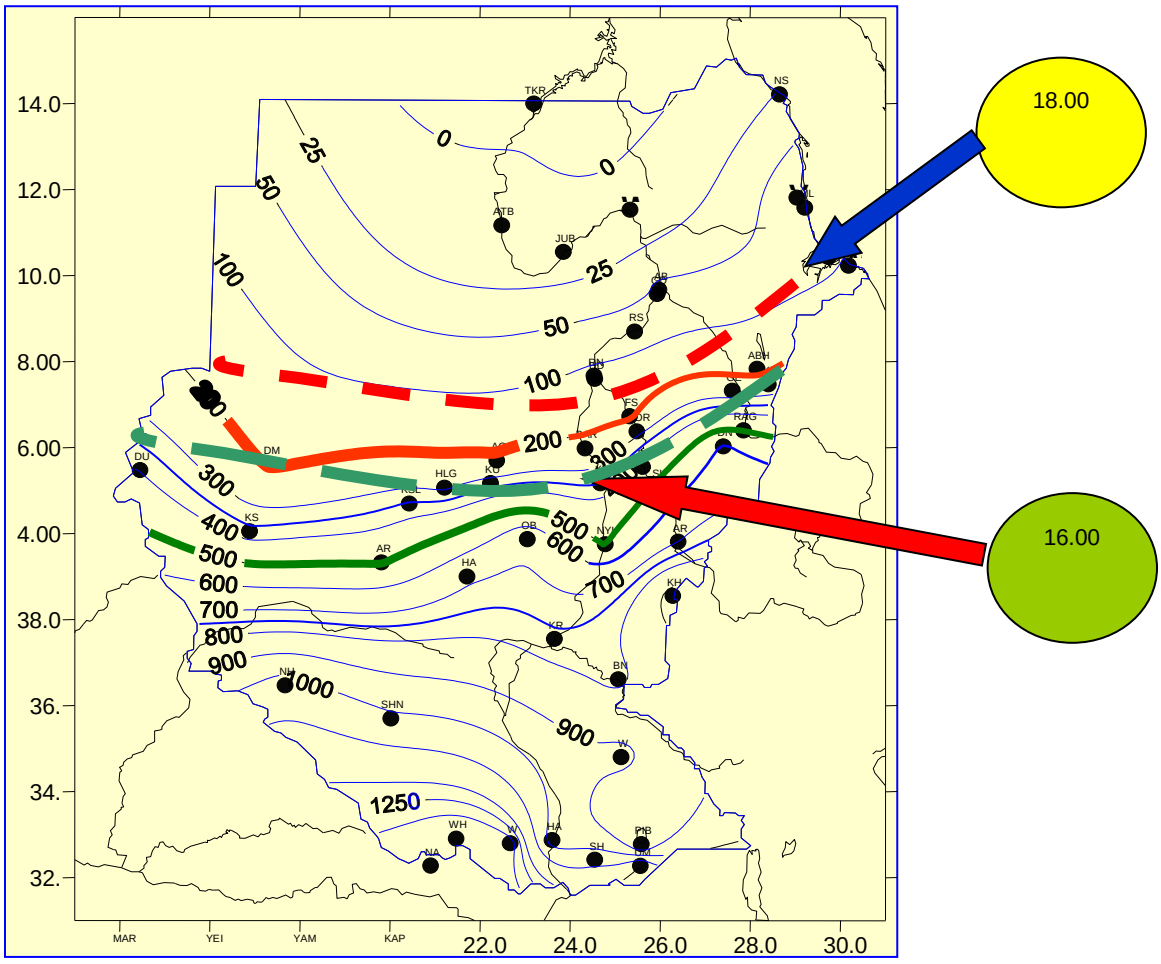


Figure 4: **Comparison of the mean annual rainfall isohyets of 1971-2000 to1941-1970.(Source: Sudan Meteorological Authority, 2002)**

Remark: dotted red and green lines of 200 mm and 500 mm for the normal of 1941-1970 and the continuous red and green lines of 200 mm and 500 mm for the normal 1971-2000

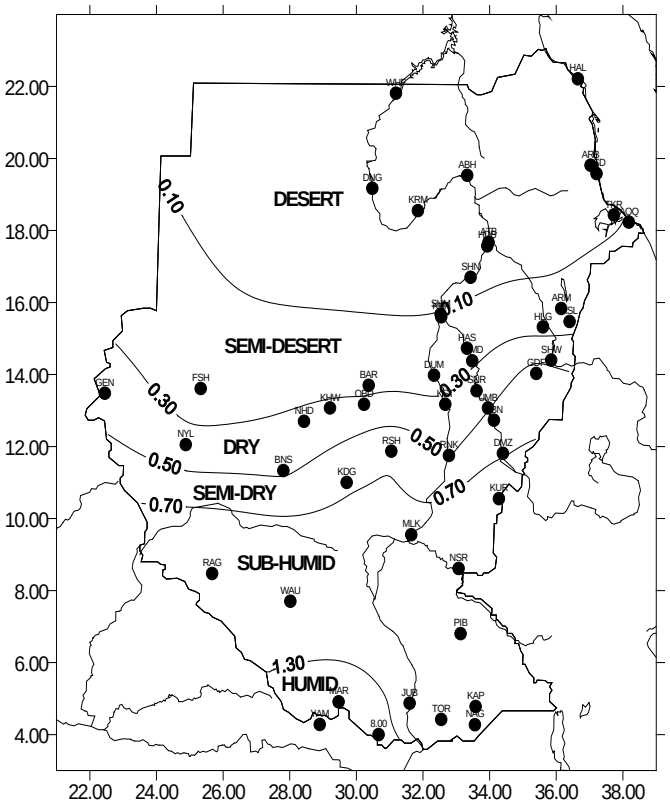


Figure 5: Sudan Climate Zones (5) for the period of 1971 - 2000

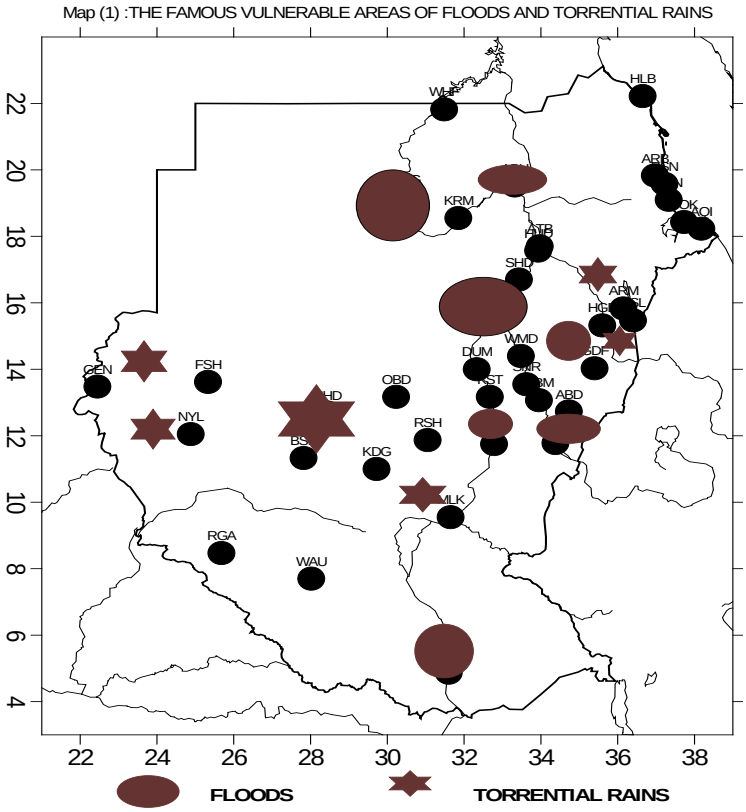
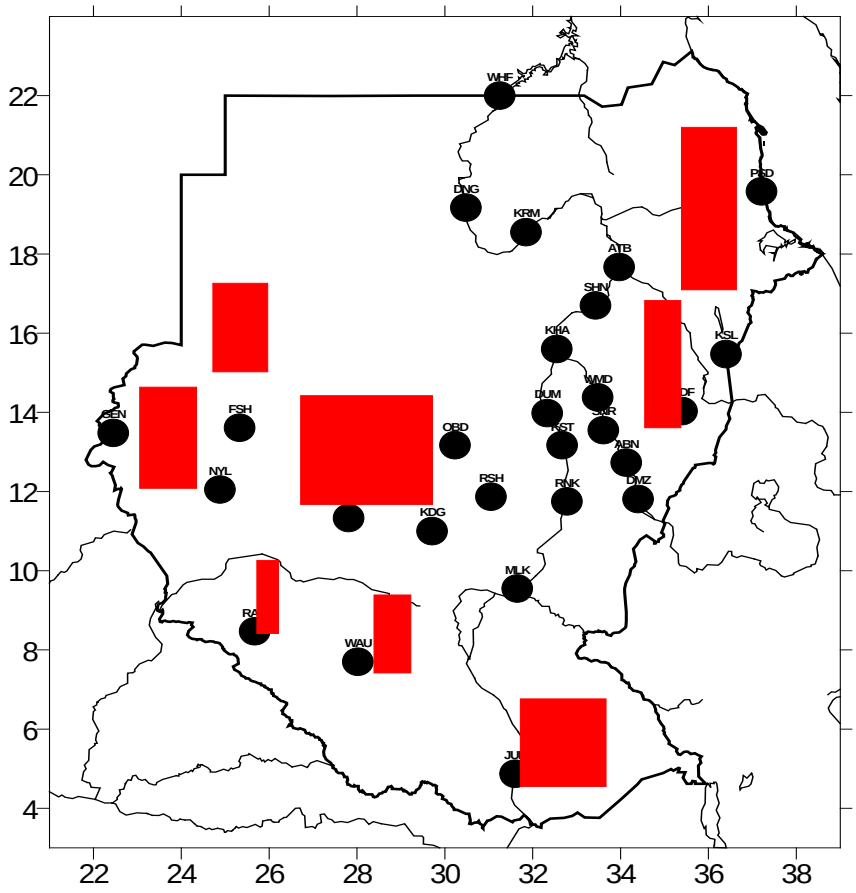


Figure 6: The most vulnerable zones for floods and torrential rains

Map (3): THE AREAS OF DROUGHT IN 2003



THE DROUGHT HAD COVERED WIDE ARESA IN DARFUR,

KORDOFAN AND RED SEAS AND SOME POCKETS IN THE EQUTORIA

Figure 7: Severe drought areas in 2003

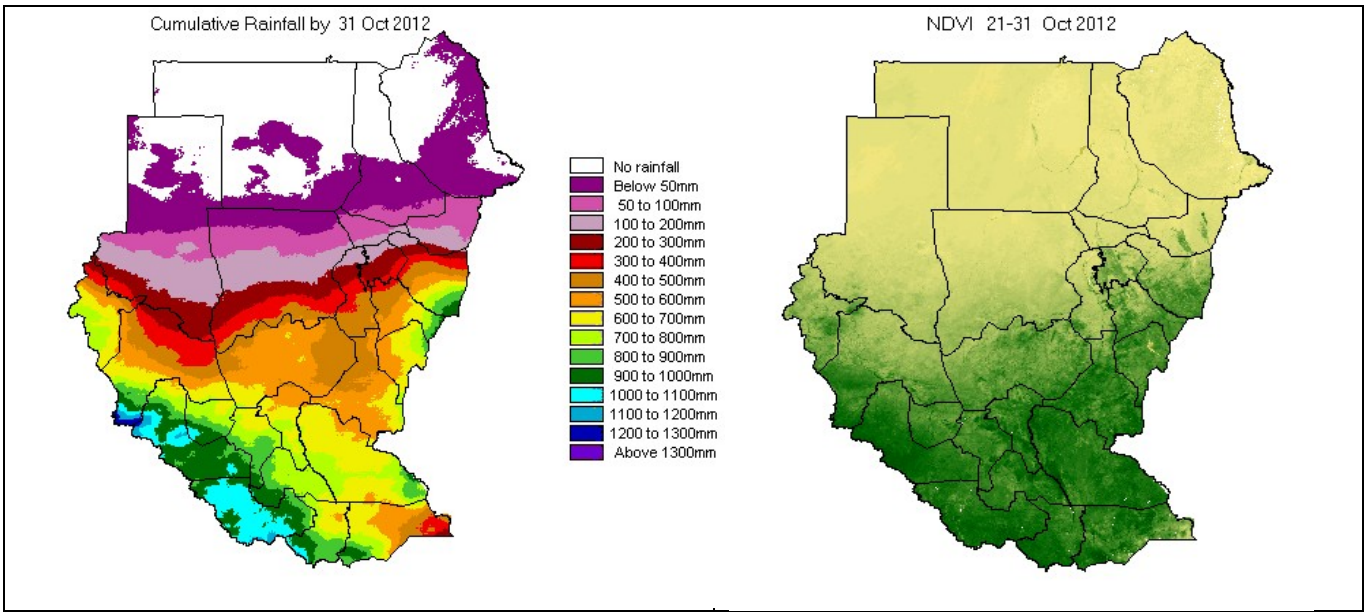


Figure 8: Cumulative rainfall & NDVI up to 31 October 2012 Source: (SAMIS-SMA)

Remark: (SAMIS Bulletin-SMA). The SAMIS programme was terminated by the end of 2012 and SMA is looking for renew these localized forecasts.

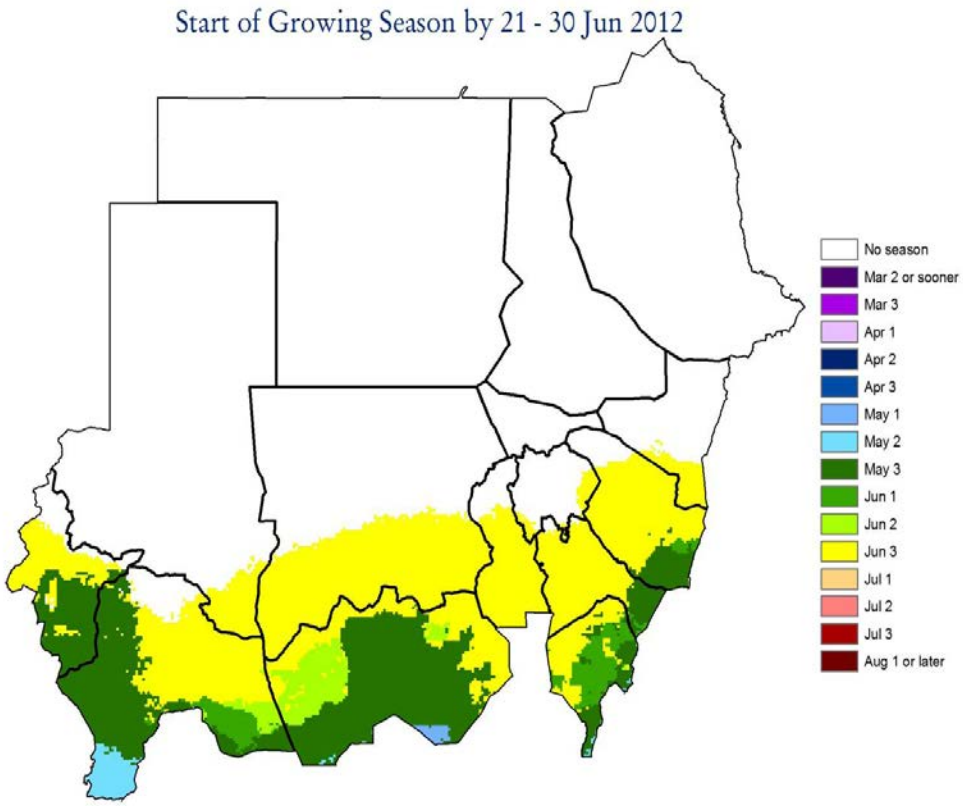
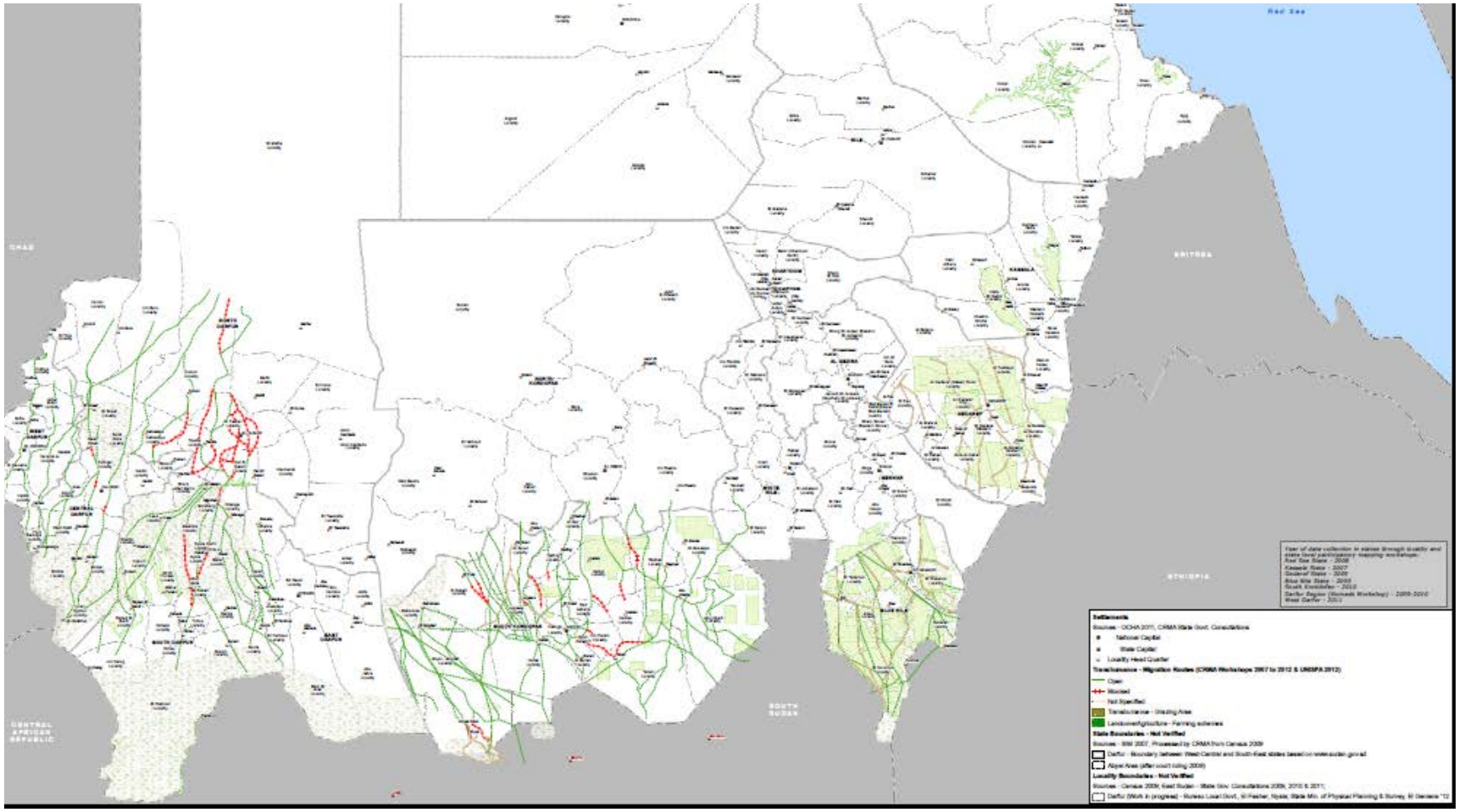


Figure 9: Start of growing season by 21-30 June 2012 Source: RSA, derived with NDVI satellite images

9d) Livestock Migration Routes (Source: UKAID, Transhumance Study June 2013



Annex 10: Environmental and Social Screening Procedure

(See document attached)