

# Terminal Evaluation Report

August 2018

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## Strengthening Climate Information & Early Warning Systems in Uganda (SCIEWS)

UNDP PIMS ID: 5094 GEF Project ID: 4993

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<b>Country:</b>	Uganda
<b>Region:</b>	Africa
<b>Focal Area:</b>	Climate Change (GEF-5)
<b>Implementing Agency:</b>	United Nations Development Programme
<b>Executing Agency</b>	Ministry of Finance Planning & Economic Development
<b>Implementing Partner:</b>	Ministry of Water and Environment (MWE)
<b>Project Timeframe:</b>	Jan 2014 – July 2018

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## Terminal Evaluation Opening Page

<b>Project Name:</b>	Strengthening Climate Information & Early Warning Systems Uganda (SCIEWS)		
<b>GEF Project ID:</b>	4993		
<b>UNDP PIMS ID:</b>	5094		
<b>Country:</b>	Uganda		
<b>Region:</b>	Africa		
<b>Focal Area:</b>	Climate Change Adaptation (GEF-5)		
<b>FA Strategic Framework Objectives:</b>	CCA-2, CCA-3		
<b>GEF CEO Endorsement Date:</b>	November 2013		
<b>Project document Signature</b>	January 2014		
<b>Planned Timeframe:</b>	<b>Start:</b> Jan 2014	<b>Closure:</b> Dec 2017	
<b>Actual Timeframe:</b>	Jan 2014	July 2018	
<b>Implementing Partner / Executing Agency:</b>	Ministry of Finance, Planning & Economic Development / Ministry of Water & Environment		
<b>Implementation Modality:</b>	National Implementation		
<b>Other Responsible Parties:</b>	Uganda National Meteorological Authority Department of Water Resources Management; Office of the Prime Minister		
<b>Project Cost:</b>	US\$ 27,664,000 (exc. PPG)		
<b>GEF PPG Grant:</b>	US\$ 691,600 (inc. \$100,000 GEF grant)		
<b>GEF Project Grant:</b>	US\$ 4,000,000		
<b>Co-Financing:</b>	US\$ 23,664,000		
	UNDP	US\$3,900,000	
	Government	US\$17,000,000	
	Other	US\$2,764,000	
<b>TE Review Timeframe:</b>	June – Aug 2018		
<b>Evaluation Team:</b>	Michael Mbogga, National Consultant Richard Sobey, International Consultant / Team Leader		
<b>TE Reporting Language:</b>	English		

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Annexed in a separate file: Tracking Tools

Annexed in separate file: Audit trail from received comments on draft TE report

#### **Exhibits:**

- Exhibit 1: Project Information Table
- Exhibit 2: Ratings Summary Table
- Exhibit 3: Ratings & Achievement Summary Table
- Exhibit 4: Recommendations Table

#### **Disclaimer**

The views of the TE were discussed with UNDP, Board members, the Ministry of Water and Environment representative departments or agencies (Uganda National Meteorological Authority and the Department of Water Resources Management), Office of Prime Minister representative department (Department of Relief, Disaster Preparedness & Management), local government partners and other key stakeholders. There was a debriefing / stakeholder workshop held to present views and refine findings. UNMA, DWRM, OPM, UNDP and RTA, provided comment on the draft report before finalization.

The views held within this report are those of the TE team.

#### **Acknowledgement**

The evaluation team would like to acknowledge all project partners who supported the development of this TE. In particular, the TE team would like to thank: Milton Waiswa of UNMA who facilitated and joined us on the field phase of the mission; Pascal Onegiu Okello, the Project Manager who provided the bulk of the documentation, and UNDP CO staff who coordinated the Terminal Evaluation.

## Abbreviations and Acronyms

Adcon	Commercial name of SCIEWS's main climate data collection system (Adcon Telemetry GmbH)
AEAS	Agricultural Extension & Advisory Services
AMAT	Adaptation Monitoring and Assessment Tool (LDCF/SCCF CCA GEF Tracking Tool)
AMSS	Automatic Message Switching System
APR/PIR	Annual Project Report / Project Implementation Report
ATLAS	UNDP tracking system
AWP	Annual Work Plan
CAA	Civil Aviation Authority
CAO	District Chief Administrative Officer
CD	Climate data – i.e. largely unprocessed data from the weather stations
CI	Climate information (including weather forecasts and re-packaged information)
CIRDA	Climate Information for Resilient Development in Africa – an allied regional coordination project
CPAP	UNDP Country Programme Action Plan
DAES	Directorate of Agricultural Extension Services of MAAIF
DDMC	District Disaster Management Committee
DDP	District Development Plan
DDPM	Department of Disaster Preparedness & Management (a RP under OPM)
DPD	District Production Departments of DAES
DRR/M	Disaster Risk Reduction / Management
DWRM	Department of Water Resource Management (of MWE) – a key implementing entity
EA	Executing Agency (MFPED)
EN	Earth Network – company producing the TSEWSs
EWS / I	Early Warning System / Information
GEF	Global Environment Facility
GHACOF	Greater Horn of Africa Climate Outlook Forum – a sub-group of ICPAC
GoU	Government of Uganda
HACT	Harmonised Approach to Cash Transfers (i.e. Cooperation agreement between UNDP & the IP)
ICPAC	IGAD Climate Prediction & Application Centre (quarterly East Africa seasonal forecasting in Nairobi)
IGAD	Intergovernmental Authority on Development (8-country trade bloc from the Horn of Africa, Nile Valley and the African Great Lakes)
IP	Project Implementing Partner (MWE)
ISO	International Standards Organisation – relevant to the quality of CI transmitted by UNMA internationally
LDCF/SCCF	Least Developed Countries Fund / Special Climate Change Fund (administered by GEF)
M&E	Monitoring and Evaluation
Met	Meteorological abbr.
MAAIF	Ministry of Agriculture, Animal Industries & Fisheries (an RP)
MFPED	Ministry of Finance Planning and Economic Development
MoLG	Ministry of Local Government
MTR	Mid-term Review (of the project)
MWE	Ministry of Water & Environment (PB Executive)
NAPA	National Adaptation Programme of Action
NECOC	National Emergency Communications & Operations Centre (under DDPM)
NIEWS	National Integrated EWS – monthly news bulletin issued by NECOC
NIM	UNDP National Implementation Modality
NMC	UNMA National Meteorological Centre
O&M	Operation & Maintenance
OPM	Office of Prime Minister
PB	Project Board
PIMS	Project Information Management System
PM	Project Manager
PMU	Project Management Unit
PPP	Public private partnership
PRF	Project Results Framework (~logframe / Strategic Results Framework)
PTC	Project Technical Committee

RP	Responsible Party (ies) (implementing on behalf of the IP)
RTA	Regional Technical Advisor (UNDP-Addis Ababa)
SMART	Specific, Measurable, Achievable, Relevant and Time-bound
TE	Terminal Evaluation (of the project)
TRAC	Thematic Resources Assigned from the Core (UNDP)
TSAWS	Total Solutions Automatic Weather Stations (commercial name of an alternative weather system trialled under the project)
UCC	Uganda Communications Commission (a RP)
UNCCD	United Nations Convention to Combat Desertification
UNDAF	United Nations Development Assistance Framework
UNDP	United Nations Development Programme (GEF Implementing Agency, member of PB)
UNDP CO	UNDP Country Office
UNDSS	UN Department for Safety and Security
UNFCCC	United Nations Framework Convention on Climate Change
UNMA	Uganda National Meteorological Authority (semi-autonomous under the MWE, formerly Dept. of Meteorology (DOM) – the main implementing entity)
WMO	World Meteorological Organisation

Synoptic weather stations – provide data for a summary of the current climate, in terms of pressure pattern, fronts, wind direction / speed and how they will change over the coming few days. WMO ISO standard synoptic weather data is now transmitted by 10 AWSs in Uganda to international receivers – every 15 minutes and by block broadcasts three times a day at 9AM, 3PM and 6PM.

**UNITS** US\$ United States Dollar; m Million; Ha hectare (100 m x 100 metres)

## Executive Summary

The executive summary is a nine page summary of the the Terminal Evaluation (TE) report. The full report is presented after the abbreviations page which separates the two sections.

<b>Exhibit 1: Project Information Table</b>			
<b>Project Title:</b>	Strengthening Climate Information and Early Warning Systems in Uganda		
<b>UNDP Project ID (PIMS #):</b>	5094	<b>PIF Approval</b>	June-12
<b>GEF Project ID (PMIS #):</b>	4993	<b>CEO Endorsement</b>	Nov-13
<b>Country</b>	Uganda	<b>Project Document (ProDoc) Signature</b>	Jan-14
<b>Region</b>	Africa	<b>Project Manager hired</b>	Mar-14
<b>Focal Area</b>	Climate Change	<b>Inception Workshop</b>	Mar-14
<b>Strategic Programs</b>	SO-2	<b>Mid Term Review Terminal Evaluation</b>	Nov-16 Jul-18
<b>Trust Fund</b>	GEF-5	<b>Project closing date</b>	Jun-18
<b>Modality</b>	NIM		
<b>Executing Agency / Implementing Partner</b>	Ministry of Finance, Planning & Economic Development / Ministry of Water & Environment		
<b>Other Partners / Responsible Parties</b>	UNMA, DWRM, OPM / DDPM, MAAIF, MoLG, UCC.		
<b>Project Financing:</b>	<b>at CEO endorsement (USD)</b>	<b>at Terminal Evaluation (USD)*</b>	
<b>[1] GEF financing:</b>	4,000,000	3,949,894	
<b>[2] UNDP contribution:</b>	3,900,000	3,900,000	
<b>[3] Government:</b>	17,000,000	16,100,000	
<b>[4] Other partners:</b>	2,764,000	1,600,000	
<b>[5] Total co-financing [2 + 3+ 4]:</b>	23,664,000	21,600,000	
<b>PROJECT TOTAL COSTS [1 + 5]</b>	<b>27,664,000</b>	<b>25,549,894</b>	

\*Actual expenditures and co-financing contributions through 30 June 2018

## Project Description

### Problem to Solution

The problem that the SCIEWS project sought to address was that climate information (CI) and early warning systems (EWS) were not functioning effectively or in support of local communities and key sectors needing to adapt. CI was needed for long-term planning with a better knowledge of expected climate change impacts, such as those due to an increase in frequency and intensity of droughts, floods and severe storms. The before project scenario was one of 'without improved CI / EWS, social and economic development would be seriously undermined. In the before-project scenario, the focus was on relief and rehabilitation or reactive actions.

The shortfall in capability included: insufficient understanding of climate risk; inadequate monitoring and forecasting of climate hazards; weak communication and packaging of warnings; restricted responses to impending climate hazards; and inadequate planning for long-term climate change.

CI / EWS technologies and capacities were out of date and / or limited, including: climate data (CD) recording and transmitting equipment; weather forecasting and analysis equipment / software; skills to utilize CI / EWS technologies.

Thus, the effective goal of the project was to establish a functional network of meteorological and hydrological monitoring stations to help understand better the weather and climatic changes overtime and provide timely information to avert any weather or climate change disasters.

### Project Strategy

The project directly contributes towards the 2016 Sustainable Development Goals (SDGs)<sup>1</sup> and their targets, in particular Goal 13 (take urgent action to combat climate change and its impacts) including its targets 13.1 (strengthen resilience and adaptive capacity to climate-related hazards & natural disasters) and 13.2 (integrate climate change measures into national policies, strategies and planning.)

The LDCF project directly supports the National Adaptation Programme of Action (NAPA) on Climate Change under UNFCCC. The NAPA priorities are: Strengthening meteorological services, including expanding weather observation infrastructure (networks) and promoting a multimedia approach to weather and CI dissemination; and Climate change development & planning project, including reviewing policies and laws in relation to climate change and sensitizing and training decision-makers, planners and implementers to the impacts of climate change.

### Project Location

Despite an initial focus on the Kyoga catchment in the east, the project was implemented nationwide. Installation of AWSs and AWLSs were installed for improved provision of CI and early warning information (EWI) across Uganda.

### Project Description

The project was designed with two main outcomes:

1. Enhanced capacity of the UNMA and DWRM to monitor and forecast extreme weather, hydrology and climate change
2. Efficient and effective use of hydro-met and environmental information for making early warnings and long-term development plans

The UNDP project webpage described the main outputs:

1. Establish a functional network of met and hydro monitoring stations and associated infrastructure to better understand climatic changes
2. Develop and disseminate tailored weather & climate information (including alerts & advisories, and risk / vulnerability maps) to decision-makers at national level and in the Teso & Mt Elgon sub-region
3. Integrate weather & climate information (CI) into national policies and local development plans in the districts of Bukedi, Busoga, Elgon, Teso, Acholi, Karamoja and Lango sub-regions

## Purpose and Methodology

The objective of the TE was to gain an independent analysis of the results of the project. The TE focused on identifying project design issues, assessing progress towards the achievement of the project objective, and identifying lessons-learned about the action. Findings of this review are also incorporated as sections on sustainability and impact, as well as providing recommendations for the future. The project performance was measured based on the indicators from the project's strategic results framework and relevant GEF tracking tools. The TE was an evidence-based assessment which relied on a review of documents, consultation with stakeholders and field observation.

## Evaluation Ratings Summary

GEF-financed UNDP-supported projects of this type require the TE to evaluate the implementation according to set parameters and ratings. The result of this TE is presented:

**Exhibit 2: TE Ratings Summary Table**

1. Monitoring & Evaluation	Rating	2. Implementing Agency (UNDP) & Executing Agency (MWE) Execution	Rating
Overall quality of M&E	MU	Overall quality of Implementation / Execution	S
M&E Design at entry	MU	Quality of UNDP Implementation	S

<sup>1</sup> Transforming our world: the 2030 Agenda for Sustainable Development Agenda 2030 - [http://www.un.org/ga/search/view\\_doc.asp?symbol=A/RES/70/1&Lang=E](http://www.un.org/ga/search/view_doc.asp?symbol=A/RES/70/1&Lang=E)



M&E Implementation	MU	Quality of Execution – MWE / UNMA	S
<b>3. Assessment of Outcomes</b>	<b>Rating</b>	<b>4. Sustainability</b>	<b>Rating</b>
<b>Overall Project Outcome (Objective)</b>	<b>S</b>	<b>Overall Likelihood of Sustainability</b>	<b>ML</b>
Effectiveness of Outcome 1	S	Financial resources	ML
Effectiveness of Outcome 2	MS	Socio-economic	ML
Efficiency	MS	Institutional framework & governance	L
Relevance	R	Environmental	ML
<b>5. Impact</b>	<b>Rating</b>		
<b>Impact</b>	Significant		

Detailed ratings are tabulated below in **Exhibit 3**. A description of the scales is provided in section 1.5

<b>Exhibit 3: TE Ratings and Achievement Summary Table</b>	
Project: Strengthening Climate Information & Early warning systems in Uganda (GEF Project ID: 4993; UNDP PIMS ID: 5094)	
<b>TE Rating</b>	<b>Achievement Description</b>
	<b>Outcomes/ Results</b>
Results Overall Project Objective Achievement <b>Satisfactory</b>	<p><b>Objective:</b> To strengthen the weather, climate &amp; hydrological monitoring capabilities, EWSs and information for responding to extreme weather and planning adaptation to climate change</p> <p>The <b>overall TE Rating is Satisfactory</b></p> <p><b>Justification:</b> The attainment of the project objective was primarily due to the achievement of Outcome 1 and 2 in terms of the provision of generation of climate data (CD) and in the generation of climate information (CI) and early warning information (EWI) through alerts and advisories.</p> <p>UNMA has clearly built capacity in the provision of climate services, although it remains understaffed, in both technicians to maintain the new generation of weather stations, but also in climate analysts to prepare the forecasts. These forecasts vary in frequency (15 minute, hourly, 6-hourly, daily, 3-day, 10-day, monthly, seasonal), locale (city, regional) and type (rainfall with above or below rainfall areas, and with advisories – for agriculture and water &amp; energy in particular). However, the present capacity to maintain the NMC in good working order appears somewhat limited, although the reasons are unclear.</p> <p>UNMA’s budget has increased from US\$2.5m in 2014/15 to ~US\$9.0m in 2018/19, although a third of this is due to donor contributions. UNMA now as a semi-autonomous authority has the mandate to raise revenue from the sale of its services, but the overriding reason for its existence is to provide climate information as a public service, which means that the two sides of the business should separate.</p> <p>The indication is that whilst the newly formed UNMA is being heavily invested in, comparatively DWRM is struggling. At present DWRM has AWLSs that it can’t bring to full operation for automatic data transmission (for flood warning) and that it can’t maintain due to lack of budget. It is assumed that the newly planned flood modelling unit will re-vamp its fortunes. Also, for DWRM, there appears to be a missing link between catchment-based planning (DWRM) and hazard mapping (NECOC).</p> <p>There were two indicators individually rated:</p> <ul style="list-style-type: none"> <li>- <u>Capacity Scorecard</u> – <b>Satisfactory</b></li> <li>- <u>Finance committed to monitor climate</u> - <b>Satisfactory</b></li> </ul>
Effectiveness - Outcome 1 Achievement <b>Satisfactory</b>	<p><b>Outcome 1:</b> Enhanced capacity of UNMA &amp; DWRM to monitor &amp; forecast extreme weather, hydrology and climate change</p> <p>The <b>overall TE rating is Satisfactory</b></p> <p>Justification:</p> <p><u>% coverage of climate/weather and hydrological infrastructure</u> – <b>Satisfactory</b> - From a baseline of 10%, UNMA’s national coverage of AWSs is now at 29%, with one station able to capture CD representative of at least two districts. SCIEWS has contributed 63% of AWSs in the country. Twenty AWSs were installed, with 29 other stations upgraded. With the addition of an Automatic Message Switching System (AMSS), 12 synoptic stations are now able to transmit internationally on a quarter hour basis.</p>

	<p>From a baseline of 4%, DWRM's coverage of AWLS is now 40%. Sixteen AWLSs were installed with 28 stations' housing constructed for telemetry. However, at some locations data is still collected manually due to the challenge of a regular power supply.</p> <p><u>Frequency &amp; timeliness of climate-related data</u> – <b>Satisfactory</b> - For the transmission of climate data (CD), the AWSs transmit at near real time, with the synoptic stations transmitting every 15 minutes. At NMC, the short-term weather forecasting is every 6 hours and as the weather changes.</p> <p>DWRM's AWLSs have data loggers, but at present telemetry is not installed, thus data collection is manual on a weekly or monthly basis.</p> <p>For the analyzed weather and climate data, i.e. climate information (CI), the frequency of dissemination is every 10 days, monthly, seasonally with a two-week lead in time. For flood advisories, DWRM needs to visit the AWLSs on an ad hoc basis. For flood warnings, NECOC however has to rely on UNMA's weather data and other open-sourced information</p>
Effectiveness - Outcome 2 Achievement	<p><b>Outcome 2: Effective use of hydro-met information for making EWs and long-term development plans</b></p> <p><b>The overall TE rating is Moderately Satisfactory</b></p> <p><b>Justification:</b></p> <p><u>% of population accessing improved CI &amp; EWI (drought, flood &amp; storm warnings)</u> – <b>Moderately Satisfactory</b> - The percentage of population accessing CI / EWI has not been recently surveyed, nor was the TE able to sufficiently verify the figures. Access to CI / EWI has improved significantly over the project lifespan. Following the integration and dissemination of CI / EWI through NECOC, the OPM has been able to issue a monthly National Integrated EWS (NIEWS) bulletin since December 2016. The NIEWS bulletins are relayed through MoLG, down to district government. UNMA generates the CI, which is added to by NECOC in terms of EW, and my MAAIF in terms of agricultural advice</p> <p><u>Sector-specific policies, budgets &amp; development plans that integrate CI</u> – <b>Moderately Unsatisfactory</b> - Five national plans were assessed. The NDPII, the MWE development plan and the UNMA strategic plan all consider the importance of creating an AWS network, accessing and utilizing the CI. The National Policy for Disaster Preparedness was considered out of date (2010). The MAAIF strategic plan doesn't mention utilisation of CI.</p> <p>Fifteen DDPs (DDPIIs 2015-20) were assessed, which all mentioned awareness of climate change and mainstreaming of climate change actions across sectors and into local programmes, however only a few described mainstreaming weather, CI and EW into planning and activities, with budgetary evidence weak. This infers that SCIEWS was not effective in mainstreaming CI / EWI into local planning for this phase 2015-20, but it does provide evidence that a Phase II or follow-up project is required.</p>
	<b>Efficiency</b>
Efficiency MS	<p>Despite the issue of funds going to CIRDA and to Earth Networks, the project managed its funds well, including major contributions from UNMA and OPM in particular.</p> <p><b>Efficiency Rating – Moderately Satisfactory</b></p>
	<b>Relevance</b>
Relevance R	<p>The project was relevant to national environmental and developmental priorities and was in line with GEF / LDCF climate change priorities. SCIEWS was designed in support of the National Development Plan (2010-14), National Disaster Risk Reduction &amp; Management Policy (DRRM), National Climate Change Policy (NCCP, 2013/14), and NAPA (2007).</p> <p><b>Relevance Rating – Relevant</b></p>
	<b>Implementation – Execution</b>
Implementation Satisfactory	<p><b>Project Implementation:</b> According to the given five categories (Implementing Agency - IA or Executive Agency - EA coordination &amp; operational matters, partnership arrangements &amp; stakeholder engagement, finance &amp; co-finance, M&amp;E systems (see next), and adaptive management (work planning, reporting &amp; communications)</p> <p><b>Overall Rating: Satisfactory</b></p> <p><b>Justification:</b> The implementation of most of the categories was satisfactory, with only minor short-comings (lack of M&amp;E system, lack of a formal implementation agreement (apart from the</p>

	<p>project document) between partners). Project implementation was fairly efficient and effective, although reporting (PIRs) was not of a high quality. This was due to UNMA implementing the project, but the PMU reporting the project, there was a slight disconnect.</p> <p><b>IA and EA Coordination &amp; Operational Management</b></p> <p><b>IA (UNDP) - Satisfactory</b></p> <p>UNMA were satisfied with timely support from UNDP and the operational support provided by the PMU (under NIM), and noted that procurement had been 70% effective. SCIEWS was noted for being responsive and adaptive to change / issues that arose, with risk being managed. An example of adaptive management, would be the project no-cost extension of six months from 13 Dec 2013 until 30 June 2018, which allowed for the time-consuming procurement of equipment and operationalization to catch-up.</p> <p>A PMU provided operational management support under National Implementation Modality, as UNMA were not accredited to take on the UNDP project directly.</p> <p><b>IP (MWE / UNMA) – Satisfactory</b></p> <p>Partnerships arrangements were mostly established for implementation, which were based on agreement of the approved prodoc with its co-financing letters of support from MWE, OPM, MAAIF, UCC as well as from UNDP. The partnerships were administered and guided by the PB, its PTC and the PMU.</p> <p>The establishment of NECOC and their uptake of CI from UNMA and issuing the EW bulletins was of significant value. Without this relationship, the project would not have been so successful.</p> <p><b>Partnership Arrangements &amp; Stakeholder Engagement</b></p> <p>Operational partnership arrangements (institutional mechanisms and capacity) are the backbone for delivering new policies and services. At national level, the following are assessed in the report: UNMA, NMC, DWRM, OPM and their Department of Disaster Preparedness &amp; Management, (DDPM), NECOC, MAAIF and their AEAS. The strong working relationship between UNMA and OPM was of prime importance.</p> <p>For local partner engagement, there was a two-way flow of information from national to local level primarily involving the District Government &amp; District Disaster Management Committee (DDMC), and the District Production Department (DPD). This was facilitated by government institutional directives.</p> <p><b>Finance</b></p> <p>Disbursement of the GEF Trust Fund grant almost reached 100%. Co-financing was considered to be good.</p> <p><b>Adaptive management (work planning, reporting &amp; communications)</b></p> <p>Workplans and budgets were prepared. Annual reports were produced by the PMU. PIRs were written.</p> <p>Communications within the project were considered good, especially in having a PMU to support UNMA in the implementation of the project and liaise with UNDP. What UNMA did not do was prepare any specific project implementation agreements with the other responsible parties apart from with OPM with whom an ‘administrative request system’ was used. This meant that despite representation on the PB, the other parties tended to follow the lead of the chair (MWE) and the project coordinator (Director of UNMA), and in the case of the PTC, it was chaired by OPM. Thus, the impression is that DWRM and MAAIF tended to be more passive partners in the project.</p> <p>Also, as the UNMA mandate was to deliver CI for national and district level consumption, it was left to OPM with the support of MoLG to deliver a mechanism to transfer CI / EWI to sub-county, parish and village level.</p>
	<p><b>Monitoring &amp; Evaluation</b></p>
<p>M&amp;E MU</p>	<p><b>M&amp;E Systems – Design &amp; Implementation</b></p> <p><b>Overall quality of M&amp;E – Moderately Unsatisfactory</b></p> <p>Due to the short coming on not setting up an M&amp;E system, feedback and adaptive management was slower than expected. This impacted on the project in that it continued to have an equipment focus into year three, when other activities should have come more to the forefront earlier in the project cycle (e.g. training the next generation of weather analysts, bring MAAIF into the project)</p> <p><b>M&amp;E at Design - MU</b></p>

	<p>SCIEWS didn't set up a monitoring system at the start, thus it was unable to clearly see or report its results in a systematic way.</p> <p><b>M&amp;E Implementation - MU</b></p> <p>Without an M&amp;E system, the project was unable to report effectively with respect to a number of indicators, nor had the ability to feedback effectively on progress, such as dissemination of CI within the districts and its uptake.</p>
	<p><b>Sustainability</b></p>
<b>Sustainability ML</b>	<p><b>Sustainability:</b> According to the four GEF risk categories (financial, socio-economic, institutional &amp; governance and environmental), present status, and towards the future is assessed.</p> <p><b>Overall Rating: Moderately Likely</b></p> <p><b>Justification:</b></p> <p><b>Financial Risks to Sustainability – Moderately Likely</b></p> <p>UNMA is largely a public service that needs on-gong funds for maintaining its weather equipment and for maintaining a capability for CD analysis and CI production. The state budget has increased significantly, which is supplemented by an annual request to development partners. The UNMA strategic plan will need updating next year if not already, not least with MoFPED financing being on a three-year rolling system.</p> <p>Concerning DWRM, the MoFPED is said not to provide much funding to it, however the MWE development plan does not bear this out. In 2019/20, DWRM expect significant shortfall in budget in order to maintain all its new and upgraded stations provided by SCIEWS. DWRM also needs funds for a flood modelling &amp; forecasting unit.</p> <p><b>Socio-Economic Risks to Sustainability - Moderately Likely</b></p> <p>In the context of livelihoods, a promising start has been made, not least in updating the CI systems and the establishment of NECOC which are driving CI / EWI dissemination. SCIEWS wasn't designed to take the next step in 'improving livelihoods' and ensuring adaptation measures. This now obviously needs to come in via the new Agricultural Extension &amp; Advisory Service (AEAS) and new projects.</p> <p><b>Institutional Framework &amp; Governance Risks to Sustainability -Likely</b></p> <p>UNMA – Long-range forecasting - Despite SCIEWS support, UNMA needs a further eight terabytes computer storage + processing power to run in-country seasonal climate models. As part of efforts to decentralise met services, UNMA has officers proposed and budgeted for the four regional zones (Eastern, Northern, Western / SW, and Central), although they are not yet deployed. This devolvement plan is expected to begin by the end of 2018, although the extent of regional services that can be provided is not clear. The UNMA strategic plan indicates a need for 250 stations to cover a country of 248,000km<sup>2</sup>, which seems excessive.</p> <p>DWRM has capacity issues with a limited capacity of staff to cope with the changing technologies; inadequate staff structure at central and zonal level; and inadequate equipment (e.g. flow measurement) at the zonal level. The DWRM will close at Entebbe and be re-designed into a Water Resources Institute. DWRM will relocate to Luzira.</p> <p>UNMA's NMC - Short-range forecasting – a number of the systems were not working when the TE visited, with added issues over their telecoms contract for data provision. This in turn affects the safety of civil aviation.</p> <p><b>Environmental Risks to Sustainability - Moderately Likely</b></p> <p>DWRM are in the process of establishing a 'water resources modelling &amp; forecasting unit', with a pilot consultancy to provide a flood prediction model and capacity, costs and equipment needs.</p> <p>Catchment planning under DWRM needs to be enacted and integrated. MWE Water and Environment Sector Development Plan 2015/16 - 2019/20 Key priority 1 includes 'promote catchment based integrated water resources management'. The MWE plan indicates: UGX62.75b for integrated catchment-based water resources management (at the zonal level); UGX16m for developing &amp; implementing 20 catchment-based management plans in four water management zones; and UGX 33.3m for operationalizing a flood management framework for Kasese, Awoja and Manafwa catchments.</p>
	<p><b>Impact</b></p>

<b>Impact Significant</b>	<p><b>Impact:</b> According to the three GEF categories (Significant, Minimal or Negligible), present status and towards the future</p> <p><b>Rating: Significant</b></p> <p><b>Justification:</b> SCIEWS, particularly with respect to UNMA has gone some way towards meeting the NAPA objectives including strengthening met services and expanding weather observation network. UNMA is at the stage of a major upgrading of CD systems installation and improving CI modelling / analytical requirements. The beneficiaries of CI such as MAAIF and NECOC are at an early stage in the further packaging and dissemination of CI / EWI, thus much remains to be achieved. SCIEWS has significantly raised climate information on the political agenda, and in understanding that such information is required, as a starting point for integrated climate planning at all levels, including catchment and EWSs. SCIEWS has demonstrated the need for further enhanced state and donor inputs.</p>
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## Conclusions

UNMA’s modernisation under SCIEWS has been successful. SCIEWS has highlighted the future minimum required status for CI and EWSs provision, and has successfully been testing the systems for the last 18 months. The capability in forecasting and its reliability has significantly improved (due to equipment upgrade and practice in forecasting). Twenty new AWSs are transmitting data to UNMA. Twelve synoptic stations are operational. These are ISO accredited to WMO standards and are contributing to East Africa / international weather forecasting.

UNMA’s CD gathering network was not significantly expanded, but AWSs were placed where needed and automated under SCIEWS, which was one of the main aims. An automatic message switching system (AMSS) was installed to share synoptic CD globally in real time. Before SCIEWS, the data from only one station was transmitted manually on a global level, with no data returned. Now ten (out of 12) AWSs transmit automatically under the global AMSS with all global data returned as required.

Based on their six-monthly portfolio review, MoFPED considered SCIEWS as a flagship or benchmark project in terms of delivery. UNMA as the lead implementing partner has met stakeholder expectations. However, the challenge remains for planning and financial commitment from government. O&M costs are an on-going issue (including re-calibration, spares / batteries & periodic maintenance).

The primary source of climate data (CD) and climate information (CI) is UNMA. It is then repackaged by NECOC and MAAIF. Districts use consolidated NECOC bulletins for EW and disaster risk management. The confidence in CI / EWS services has been strengthened under SCIEWS. However, for CI dissemination from district to sub-county to parish to farmer, there is a variable picture, with insufficient evidence to show significantly improved access to CI at the local level.

The lack of an up to date telecoms agreement for the NMC is a concern. The lack of bandwidth and uninterrupted connectivity means that key systems for short-term weather forecasting (for use by aviation at Entebbe and across Uganda) are not fully operational.

DWRM was very late in installing the AWLSs with some not yet transmitting data. This is due to the telemetry units not being installed in some stations due to a known high risk of theft and vandalism, or not operational due to a limited power supply. Added to this, DWRM missed the 2018 government planning window which should have included the request for an O&M budget for these new SCIEWS stations. Thus, in spite of the efforts of SCIEWS, Uganda remains without an effective flood warning system.

Mainstreaming of climate information remains an issue, mainly in terms of district-level development plans, within which climate adaptation measures are beginning to be described, but not the use of CI. Catchment-based water resource management planning is at an early stage and not linked to NECOC district hazard vulnerability mapping, nor available CD / CI. This needs facilitation.

SCIEWS has demonstrated the need for a phase II project.

## Recommendations

**Exhibit 4: Key Recommendations Table (with responsible entity)**

1. The next UNMA strategic plan needs to be prepared with inclusion of a longer-term forecast on state budgetary needs for a set minimum level of required public services [UNMA]
2. UNMA to assess their ability to provide tailored CI on a district-basis, to be piloted in areas which are disaster prone or of strategic agriculture importance for example. This could be piloted under another project and provide an opportunity to train further meteorology analysts [UNMA]
3. The NMC needs to become fully operational, with a new telecoms agreement for unlimited high-speed fibre-optic data transmission and its systems for short-range weather forecasting for aviation debugged. [UCC / UNMA]
4. The development of a new GCF-funded project should be expedited, with the inclusion of piloting dissemination of CI to farmer level [UNMA with DAES]
5. An EWS for flood response is needed. A management decision is required on the level of security and local awareness needed for key AWLSs to be automated with telemetry [MWE]. A DWRM flood forecasting & modelling unit feasibility needs expediting [DWRM]
6. Catchment-based water resources planning is needed to mitigate flooding. The technical capacity of DWRM and its zonal offices needs to be strengthened. Catchment-based plans are part of the MWE plan, however a donor project also should be sought to strengthen this. [MWE / MoFPED funding]
7. The main lines of agri-climate information analysis and transfer need to be assessed and strengthened, so that CI is better utilized [MAAIF / DAES]

## 1. INTRODUCTION

### 1.1. The project

This UNDP-supported GEF-financed project was titled 'Strengthening Climate Information and Early warning systems in Uganda, (PIMS 5094)' (SCIEWS). The project started in January 2014 and ended in 30<sup>th</sup> June 2018, including a five-month extension period.

The project was under National Implementation Modality (NIM) with the Ministry of Finance, Planning & Economic Development (MoFPED) as the Executing Agency, and the Ministry of Water & Environment as the Implementing Partner (IP). The IP's designated implementers were their Uganda National Meteorological Authority (UNMA) and their Department of Water Resource Management (DWRM).

The IP was working in collaboration with responsible partners and beneficiaries including: Department of Disaster Preparedness & Management (DDPM) under the Office of the Prime Minister; Ministry of Agriculture, Animal Industries & Fisheries (MAAIF); Ministry of Local Governments (MoLG); and the Uganda Communications Commission (UCC).

The project was implemented across the country, with pilot testing of its results in 28 districts<sup>2</sup> from four sub-regions of Elgon, Karamoja, Teso and Lango mostly in eastern Uganda.

### 1.2. Purpose of the evaluation and report structure

#### Purpose

This is the Terminal Evaluation (TE) of the SCIEWS project.

The objective of the TE was to gain an independent analysis of the achievement of the project at completion, as well as to assess its sustainability and impact. The report focuses on assessing outcomes and project management. The TE additionally considered accountability and transparency, and provided lessons-learned for future UNDP-supported GEF-financed projects, in terms of selection, design and implementation.

#### Structure

This report is in six sections - introduction, description, findings, sustainability, impact and conclusions / recommendations. The UNDP-GEF rating scales are described in section 1.5. The findings (section 3) are additionally divided into strategy / design, implementation / management, and results.

### 1.3. Scope and Methodology

#### Approach

The overall approach and methodology of the evaluation followed the guidelines outlined in the UNDP Guidance for Conducting Terminal Evaluations of UNDP-supported GEF-financed Projects. The TE was an evidence-based assessment and relied on feedback from persons who were involved in the design, implementation, and supervision of the project. The TE team reviewed available documents (**Annex 7**), conducted field visits and held interviews. The international consultant was the team leader and responsible for quality assurance and consolidation of the findings of the evaluation, and provided the TE report.

The field mission took place from 8<sup>th</sup> - 20<sup>th</sup> July 2018, according to the itinerary compiled in **Annex 11**. The agreed upon agenda included a UNDP briefing to the team on 9<sup>th</sup> July and a stakeholder workshop on 19<sup>th</sup> July.

#### Methods

The TE determined if the project's building blocks (technical, financial, management, legal) were put in place and then, if together these catalysts were sufficient to make the project successful. The TE method of working was to utilise a 'multi-level mixed evaluation'. This method was appropriate because the task was to evaluate delivery of a new service which was being tested through state institutions. The method allowed

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<sup>2</sup> Some districts have since split, but it was also important to locate AWS in other areas to gain balanced CD across Uganda

for a high degree of cross-referencing and was suitable for finding insights which were both sensitive and informative. Pro-forma questions on key themes such as those provided by the UNDP GEF guideline were updated by the team (**Annex 10**).

#### Main partners visited in Kampala / Entebbe and the districts

The TE team interacted with the Project Management Unit (PMU), the UNDP country office as well as with technical staff in UNMA, DWRM, DDPM / NECOC and MAAIF.

The TE team also visited several districts mainly in the eastern arc to interact with local administrators and technical staff at district, sub-county and parish levels. This was to evaluate the extent to which they were receiving and using CI / EWI.

The districts visited included Buikwe, Jinja, Mayuge, Tororo, Mbale, Kapchorwa, Bulambuli, Kumi, Soroti, Lira, Gulu and Kiryandongo. At district level, the team mainly interacted with either the District Production Department (DPD), who are responsible for agricultural extension services, or the Environment & Natural Resources Department, who are part of the EWS. The team also visited AWLs and AWSs on-route or nearby.

**Annex 6** provides a list of people that the TE met or interacted with.

#### **Risks and Assumptions**

Security - There were no distinct security issues which affected the TE, as sensitive border areas were not visited. Additional clearance was required for the visit to the National Meteorological Centre (NMC) in Entebbe due to its integration within the International airport control tower building. Travel was approved by UNDSS. Usual precautions were undertaken, with the SCIEWS Landcruiser provided for the field travel.

#### **Stakeholder feedback**

Gaining a representative view from local stakeholders was only limited by time. Additional telephone interviews with the stakeholders were arranged as necessary. Meetings were held with key partners and stakeholders (**Annex 6**, see also Mission Agenda **Annex 11**).

#### Limitations

The TE limitations were fairly standard in terms of allowable working days and thus having a time constraint.

### **1.4. Ethics**

The review was conducted in accordance with the UNEG Ethical Guidelines for Evaluators, and the reviewer has signed the Evaluation Consultant Code of Conduct Agreement form (**Annex 15**). In particular, the TE team ensured the anonymity and confidentiality of individuals who were interviewed and surveyed. In respect to the UN Declaration of Human Rights, results are presented in a manner that clearly respects stakeholders' dignity and self-worth.

### **1.5. Rating Scales**

The rating scales are provided in **Annex 10**.

## **2. PROJECT DESCRIPTION**

### **2.1. Development Context**

#### **LDCF / GEF Focal Area Strategies**

The GEF Focal Area is Climate Change Adaptation. GEF Focal Area Objectives are:

- CCA-2 (Increase adaptive capacity to respond to the impacts of climate change, including variability, at local, national, regional and global level), with its Outcome 2.2 (Strengthened adaptive capacity to reduce risks to climate-induced economic losses)
- CCA-3 (Promote transfer and adoption of adaptation technology), with its Outcome 3.1 (Successful demonstration, deployment, and transfer of relevant adaptation technology in targeted areas)



LDCF Eligibility Criteria:

- Country ownership – GoU has ratified the UNFCCC and is classed among the non-Annex 1 parties
- GoU has submitted their NAPA and are entitled to benefit from the LDCF for the implementation of priority measures
- The project is within the scope of LDCF interventions (programming paper & decision 5/CP.9).
- Financing - the co-funding is >US\$5m

**Project linkage to National Planning**

SCIEWS was designed in support of the National Development Plan (2010-14), National Disaster Risk Reduction & Management Policy (DRRM), National Climate Change Policy (NCCP, 2013/14), and NAPA (2007). It was designed in close collaboration with the Department of Disaster Preparedness & Management (DDPM). The NCCP's priority area includes monitoring, detection, attribution and prediction. It was designed to support capacity building of the then newly formed UNMA. Uganda's NAPA identified strengthening meteorology services as an urgent and immediate need for building climate change resilience.

The UNMA Act in 2012 established the semi-autonomous authority. The NDPI has now evolved into NDPII (2015-19). SCIEWS was consistent with the objectives of the UN Development Assistance Framework (UNDAF).

**Lessons learned from earlier projects**

Baseline projects are listed in **Annex 5**. A few examples are provided here:

- Early warning for fishermen on Lake Victoria – alerts sent via SMS bulk messaging
- The WFP in Karamoja has 12 district community-based AWSs with a website interface for data streams and returned information<sup>3</sup>. The lesson for SCIEWS was that AWSs really needed to auto-transmit via a modem or directly via the cell network – to later allow stakeholders to log on and get data.
- The RANET climate system - CI dissemination project – Have a focal person at community level to distribute CI to farmers in local languages. There is a noticeboard at sub-county. CI is relayed via community radio station.

## **2.2. Problems that the Project Sought to Address**

Statistics on weather events over the past three decades place Uganda at high vulnerability to climate change, as the country continues to experience increasing temperatures, shifting rainfall patterns and climate hazards particularly droughts, floods and severe storms<sup>4</sup>. Average temperatures have been predicted to increase by up to 1.5°C in the next 20 years and by up to 4.3°C in the 2080s. Rainfall patterns and total annual rainfall are also expected to change with the climate becoming more erratic and unpredictable.

The effects of climate change include increased food insecurity, increase in disease incidence, soil erosion and land degradation, damage to infrastructure and settlements, and decline in productivity of agricultural and natural resources. Extreme weather events contribute to 70% of natural disasters, which result in the annual destruction of ~800,000 ha of crops.

**Systemic weaknesses and Operational barriers**

Key barriers that needed to be addressed included:

- Obsolete and inadequate weather, climate and hydrological monitoring infrastructure, which limits data collection, analysis and provision of meteorological services.
- Limited knowledge and capacity to effectively predict future climate events as a result of an acute shortage of technology and skilled human resources.

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<sup>3</sup> These AWS are the Davis model which required a static website, which was converted to a dynamic system that didn't function (Davis AWS is sent in text format with same names, however dynamic systems need text file of different names. Also, with local staff changes, the terminal was not managed for CI use.

<sup>4</sup> Uganda has been prone to several climate related disasters, which have resulted in the loss of lives and property. This has been especially on the slopes of Mt Elgon in the east (Sironko, Bulambuli, Manafwa and Bududa district), as well as in the west on the eastern slopes of the Rwenzori mountains in Kasese. There have also been floods in the Karamoja region, in the north-east.

- No systematic process for packaging, translating and disseminating weather/climate information and warnings – including different information sources across – and within country borders
- Long-term sustainability of observational infrastructure and technically skilled human resources.
- Low community level usage of CI as a result of limited consolidation of effective dissemination channels including physical mechanisms and limited trust in warnings received

### **Problem to Solution**

The problem that SCIEWS sought to address was that climate information (CI) and early warning systems (EWS) were not functioning effectively or in support of local communities and key sectors needing to adapt. CI was needed for long-term planning with a better knowledge of expected climate change impacts, such as those due to an increase in frequency and intensity of droughts, floods and severe storms. The before project scenario was one of 'without improved CI / EWS, social and economic development would be seriously undermined. In the before-project scenario, the focus was on relief and rehabilitation or reactive actions.

The shortfall in capability included: insufficient understanding of climate risk; inadequate monitoring and forecasting of climate hazards; weak communication and packaging of warnings; restricted responses to impending climate hazards; and inadequate planning for long-term climate change.

CI / EWS technologies and capacities were out of date and / or limited, including: climate data (CD) recording and transmitting equipment; weather forecasting and analysis equipment / software; skills to utilize CI / EWS technologies.

Thus, the effective goal of the project was to establish a functional network of meteorological and hydrological monitoring stations to help understand better the weather and climatic changes overtime and provide timely information to avert any weather or climate change disasters.

## **2.3. Project Description and Strategy**

The project directly contributes towards the 2016 Sustainable Development Goals (SDGs)<sup>5</sup> and their targets<sup>6</sup> in particular Goal 13 (take urgent action to combat climate change and its impacts) including its targets 13.1 (strengthen resilience and adaptive capacity to climate-related hazards & natural disasters) and 13.2 (integrate climate change measures into national policies, strategies and planning).

### **Project Location**

Despite an initial focus on the Kyoga catchment in the east, the project was implemented nationwide<sup>7</sup>. Installation of AWSs and AWLSs were installed for improved provision of CI and early warning information (EWI) across Uganda.

### **Map of the Project Area**

See **Annex 13**

### **Project Timing & Milestones**

The project timing was from January 2014 until end June 2018. The project document does not mention milestones or benchmarks, however standard methods were followed in terms of an inception workshop being held, periodic reporting including a PMU final report, MTR and TE, and UNDP Completion report in process. In relation to the indicators (with baseline and target) and outputs, the TE assesses: outcome indicators (**Annex 1**) in order to determine gradings; and outputs (**Annex 2**) with their achievement reported

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<sup>5</sup> Report of the Inter-Agency & Expert Group on SDG Indicators (E/CN.3/2016/2/Rev.1), Annex IV, Final list of proposed SDG indicators <https://sustainabledevelopment.un.org/content/documents/11803Official-List-of-Proposed-SDG-Indicators.pdf>

<sup>6</sup> Originally the project was expected to contribute towards attainment of MDG 1 (eradicating extreme hunger and poverty), MDG 3. (promote gender equality & empower women), MDG 6 (combat HIV/AIDS, malaria & other diseases) and MDG 7 (achieving environmental sustainability). MDG 1 corresponds with SDG target 1.1, MDG 3 corresponds to SDG target 5.1 (end all forms of discrimination against all women & girls), MDG 6 corresponds to target 3.3 (by 2030, end the epidemics of AIDS, tuberculosis, malaria etc), MDG 7 corresponds with SDG target 12.2 (by 2030, achieve the sustainable management and efficient use of natural resources).

<sup>7</sup> The project overall had a national focus with AWSs and AWLSs planned to be installed in all four WMZs. Component 2 on developing & disseminating tailored CI / EWI had an initial focus on the Teso and Mt-Elgon subregions due to the region being susceptible to floods and landslides.

and commented on by the TE.

### **Comparative Advantage**

UNDP had a comparative advantage of capacity building, provision of technical support in the design and implementation of projects. UNDP also had an advantage working with government especially in strengthening institutional, policy and legislative mechanisms, in undertaking risk assessments, in mainstreaming climate change into development planning and harnessing best practices and community-based approaches across the thematic areas for climate change adaptation and disaster risk reduction. UNDP in Kampala has close working relationship with the project IP, MWE (including with UNMA and DWRM), and OPM / DDPM.

UNMA and DWRM had a pool of meteorologists and hydro-meteorologists that supported design and implementation of the project.

### **Replication**

The prodoc mentions replication three times

- Replicability will be facilitated through the increase in national coverage of the hydro-climate monitoring system & the development of standard operating procedures (SOPs), which will enable the integration of CI into planning, and which will set the conditions for operating an EWS country-wide.
- The project will generate improved CI at a national level, and activate communications and procedures for issuing alerts and advisories at a national and local level. This will include the development of mobile-based alert platform in the Teso and Mt Elgon sub-regions in the Kyoga WMZ. i.e. scope for replication in the other 11 sub-regions
- To facilitate replication, the lessons learned will be disseminated nationally through training programmes, the online platform and toolboxes including courses, handbooks and manuals

## **2.4. Implementation Arrangements**

### **Project Management Structure**

The project board (PB) was responsible for project decision-making. It was chaired by the executive director of UNMA. Beneath the PB, lay a project technical committee (PTC) responsible for the presentation to the PB of technical advice. The PTC was chaired by a senior disaster management officer from DDPM. All Implementation Partners (IPs) and key beneficiaries were represented on the PTC.

Under National Implementation Modality (NIM), a Project Management Unit was established to administer the project on behalf of the IP<sup>8</sup>, namely MWE and their designated implementor UNMA. The PMU reported up to the PTC / PB and up to UNDP.

UNDP provided the quality assurance for the project, including the management of external consultancies (audit, MTR, TE) and UNDP supported GEF-financed reporting requirements, such as the annual Project Implementation Reviews (PIRs)

Key implementors included MoFPED, MWE (UNMA, and DWRM); OPM (Department of Disaster Preparedness & Management (DDPM)). Key beneficiaries included MAAIF, and MoLG with district governments.

## **2.5 Key Partners & Stakeholders**

Implementation of the project was the responsibility of the Ministry of Water and Environment (MWE). Key partners included the Department of Meteorology which was upgraded to the Uganda National Meteorology Authority (UNMA). UNMA is the national agency responsible for collecting climate information with the mandate to provide weather forecast information to the country. Under the project, UNMA was responsible for the upgrading of weather observation equipment, enhancing capacity for weather data collection processing and dissemination.

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<sup>8</sup> MWE / UNMA were not accredited to directly manage the project, thus a PMU was established under NIM

The other partner agency was the Department of Water Resources Management (DWRM) with has the mandate for hydrological monitoring. Under the project, DWRM was responsible for hydro-meteorological monitoring, respective capacity building and for providing alerts related to flood risk and water disasters.

Another responsible party was the Department of Disaster Preparedness & Management under the Office of the Prime Minister (OPM). DDPM took the lead on Component “2 regarding packaging and disseminating EWI and other CI and knowledge products across the country. This was supported by the Early Warning Unit in the Ministry of Agriculture Animal Industry & Fisheries (MAAIF), particularly where related to agriculture.

Other stakeholders included the Uganda Communication Commission (UCC) who are responsible for telcomms regulation. UCC supported the link between government agencies and telecomm companies in the requirements for the collection of climate data and for the dissemination of alerts from OPM.

The Ministry of Finance Planning & Economic Development (MFPED) provided an oversight role on (GEF) project finances.

A full description of stakeholders – those who are responsible for implementation of the project and those associated with the project – is provided as **Annex 9**.

### **3. FINDINGS**

#### **3.1. Project Strategy**

##### **3.1.1 Project Design**

###### **Project Formulation**

The project was designed by OPM / DDPM, MWE / UNMA, with support from UNDP. MoFPED capacity in the coordination of donor funds was considered to be proficient. UNMA possessed a reasonable capacity level with allied skills. Their mandate, and under the project was to provide CI down to district level, not below. For DWRM, their capacity was much lower, hence UNMA taking the lead role as the IP, with the intention that an agreement with DWRM as an implementor or responsible party (RP) would be signed. A PMU acted on behalf of UNMA as the main designated IP, although more formally the MWE is the IP with both UNMA & DWRM designated implementers on their behalf.

District governments were encouraged to use existing structures: (District Production Department (DPD) / Extension service to disseminate agri-advisories; the District Environment /NRM office connected District Disaster Management Committees (DDMCs), to disseminate EWI and alerts also instigating a pro-active feedback mechanism. Added CI distribution was planned to be via email and radio broadcast.

District mobilization was also via the beneficiary line-agencies using standard or enhanced channels. E.g. MAAIF for agri-advisories; and MoLG supporting the DDMC chaired by the Chief Administrative Officer (CAO).

###### **Synergies during implementation and ongoing**

- UNDP Climate Change & Disaster Resilience Project provided equipment for OPM NECOC and 300 smart phones for districts.
- OPM / NECOC EWS for flooding in Butaleja District
- DDPM / NECOC District Hazard, Risk and Vulnerability Profiles (2014)
- Relief Web CI - Climate Information & Early Warnings to Save Lives and Build Livelihoods in Uganda<sup>9</sup>
- UNICEF sponsored a toll-free line (0800177777) in order to get CI / EWI from the districts. There is also a SMS 6700 platform for alerts and a WhatsApp group
- Program for Restoration of Livelihood in Northern Region (PRELNOR/IFAD) – MoLG project partnering on infrastructure development of weather observation systems in Acholi sub-region of Northern region. PRELNOR has 15 AWSs and an EW strategy. (see also Impact section). SCIEWS also provided weather and water level stations in Gulu and Kitgum both within the same region, and held a dissemination CI workshop in Lira (June 2018).

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<sup>9</sup> <https://reliefweb.int/report/uganda/innovative-climate-data-climate-information-early-warnings-save-lives-and-build>

- Global Resilience Partnership (GRP is a consortium of TAHMO, CHAI, ACLE, EN, HNI) - enhancing infrastructure development in weather observations, particularly in schools. Also since 2017, met data from Soroti airport has been shared with a Dutch University as part of the activities under the Global resilience partnership<sup>10</sup>
- Existing system of water monitoring stations supported by GIZ, IGAD and WB needed to be managed and maintained by DWRM.
- Sio-Malaba-Malakisi River Basin Management Project Phase II (20013-17) - a transboundary project between Kenya and Uganda. The project is building capacity of staff for hydrological monitoring and catchment management.
- NARO supported - ATAAS SLM and the maize variety Bazooka. WB representative for outreach in each district, so farmers get this agri / var / CI data.
- Gulu District have support from USAID for Feed the future

### New projects/ initiatives

- UNDP GCF Wetlands restoration Mpologoma and Rwizi catchments project has started to disseminate CI and is to provide 25 AWSs and 16 extra AWLSs with housing units to be completed<sup>11</sup>
- Nile Basin Initiative under DWRM concerns flood modelling using software such as MIKE.
- UNDP – cell phones, radios & cloud-based services – a free 161 service on Airtel Network will be launched shortly with access to public service information, including for regional CI in 6 local languages

### Equipment obstacles

- The technologies / equipment adopted and installed was new, thus there were some delays.
- The data sharing MoU was prepared for the telemetry systems<sup>12</sup> of the AWLSs, which though installed (functional) were not all operational.
- DWRM have five older Davis model AWSs, but without automatic loggers<sup>13</sup> or data transmission to a website, so the data is not shared. (i.e not fully installed – loggers not put in during instalment)
- There are nine older Campbell model AWSs, but also without telemetry
- EN TSAWS data is not calibrated to WMO standards or ISO approved, nor is it available to UNMA

## 3.1.2 Design Assumptions & Risks

Selected Assumptions from the results framework that proved to be correct / incorrect:

Assumption	TE Comment
<b>Outcome 1</b>	
<ul style="list-style-type: none"> <li>- Baseline projects are implemented according to the timeline identified in the PPG phase</li> <li>- Communities living near hydro-met equipment prevent it from being vandalized; Equipment is adequately maintained by the responsible institution.</li> <li>- Information technologies and telecom systems are best suited to the local context and don't restrict the transfer and communication of information.</li> <li>- The latest technologies are appropriate. The level of error for forecasting is within the minimum thresholds needed</li> </ul>	<ul style="list-style-type: none"> <li>- A baseline survey was undertaken</li> <li>- Vandalism - this assumption proved incorrect for AWLSs, due to lack of security and awareness measures, particularly the theft of solar panels</li> <li>- Telecoms systems were mostly appropriate, although in creating new mobile apps, there are protocol issues</li> <li>- TSAWS piloted before and during the project proved unsuitable due to its data restriction and not meeting WMO ISO standards</li> </ul>
<b>Outcome 2</b>	
<ul style="list-style-type: none"> <li>- Awareness raising, and the demonstration of the advantages of responding to EWS information, will ensure</li> </ul>	<ul style="list-style-type: none"> <li>- The budget for local awareness activities was cut, however the strengthening of DDMCs</li> </ul>

<sup>10</sup> <http://www.globalresiliencepartnership.org/>

<sup>11</sup> Under GCF, there is a need to demonstrate co-financing which for the wetlands project is set at GCF US\$24, GoU 18, UNDP 2m

<sup>12</sup> Telemetry system - data automatically transmitted from CI logger via a cell phone SIM with a telecoms contract and power source such as solar panel

<sup>13</sup> Data loggers were not installed during the installation process

the commitment of the communities	somewhat offset this shortcoming.
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Selected risks from the results framework with TE comment.

Risk	TE Comment
<b>Outcome 1</b>	
<ul style="list-style-type: none"> <li>- Delayed implementation of baseline projects by the government / donors negatively affects the project</li> <li>- Slow release of funds and/or procurement procedures</li> <li>- Alerts and warnings are not feasible to produce due to scientific or technological barriers.</li> </ul>	<ul style="list-style-type: none"> <li>- Complementary activities of the partners were considered very positive</li> <li>- Equipment was procured with UNDP support<sup>14</sup></li> <li>- An alert and advisory system was successfully established</li> </ul>
<b>Outcome 2</b>	
<ul style="list-style-type: none"> <li>- Lack of commitment from communities where EWS are established undermines the effectiveness of the project</li> </ul>	<ul style="list-style-type: none"> <li>- The outreach to communities was limited due to project timeframe, importance and technical difficult to establish a new CI / EWS</li> </ul>

There are two further risk tables - the active UNDP Atlas, and the final report risk table (2017) in **Annex 8**.

### 3.1.3 Results Framework Indicators & Targets

The result framework was logical, practical and feasible within the project timeframe as originally designed, however one or two indicators were not so SMART (Specific, Measurable, Attributable, Realistic/Relative, Timebound). The main problem was that they were not easily measurable.

Indicators or targets	Issue
<b>Objective level</b>	
Capacity scorecard	Somewhat subjective
Domestic finance	Not easily measurable
<b>Outcome 1</b>	
% coverage of CI infrastructure	Difficult to measure spatially, but also due to AWLSs not being fully operational
<b>Outcome 2</b>	
% of population with access to CI	Before / after project figures were not obtainable, only a 2016 survey

The other problem with the logframe, was that equipment which is usually an input, or at least classed at the output level, was listed at the outcome level and at the output level. Thus, to avoid repetition, where possible in this report, equipment numbers are relegated to the discussion of outputs.

### 3.1.4 Gender Analysis

The prodoc (p15) indicated 'The project intends to ensure that women play an adequate part in the EWS, that they benefit from CI that is relevant, and that the CI is presented and transmitted in an accessible way', and (p53) 'Operationalize an EWS dissemination toolbox including a gender sensitive trainer manual on the use of media. These approaches will be promoted at a national and local level in the Teso and Mt. Elgon sub-regions.'

The UNMA strategic plan includes gender equality as a key principle, however technical staffing remains skewed in favour of men. The strategic plan goes on to state 'Gender mainstreaming is a policy element of UNMA recruitment and work ethics. UNMA gives women added advantage during recruitment, training and promotions. The plan seeks to empower the women farmers and the general farming population with reliable CI to make day-to-day decisions. Moreover, agricultural production is rain-fed. Meteorological priorities for agricultural production will therefore impact directly on rural women'

The NDP gives priority to crosscutting issues such as gender.

<sup>14</sup> PMU note - Initially procurement of AWLSs was planned to be handled by the CO, however they lacked capacity. The task was then moved to UNDP Copenhagen, with the loss of a year in the process. Procurement of AWLSs and the stations had to be re-advertised as the initial vendors were expensive. These points together with the increased budget for 5 EN AWLSs affected outcome 2 activities which needed to be removed or reduced in scope. Inevitably, this meant that that equipment was focused on for quality assurance of the investments made.

## SCIEWS Gender Training

Gender training was UNMA-initiated with all relevant staff present. The gender training was to:

- To enhance capacity of UNMA staff to integrate gender into CI collection and dissemination
- To strengthen the capacity of UNMA to generate CI messages that are gender responsive
- To strengthen the capacity of UNMA to generate engendered policies for mitigation and adaptation to climate change; and
- To improve the capacity of UNMA in engendering its operations (inc. internal capacity building/skills development, data collection and management).

Key result areas from the UNMA gender training:

Twenty men and 20 women attended a 3-day workshop, which was the 1<sup>st</sup> of its kind for UNMA. UNMA committed to:

- Mobilize resources to empower and support the Gender Focal Point Person to coordinate gender mainstreaming activities at the Authority
- Allocate resources for mainstreaming gender and equity in UNMA policies, programmes and processes.

## 3.2. Project Implementation

**Project Implementation:** According to the given five categories (IA or EA coordination & operational matters, partnership arrangements & stakeholder engagement, finance & co-finance, M&E systems, and adaptive management (work planning, reporting & communications)

**Overall Rating: Satisfactory**

**Justification:** The implementation of most of the categories was satisfactory, with only minor short-comings lack of M&E system, lack of formal agreement with responsible parties, apart from with the OPM. Project implementation was fairly efficient and effective, although reporting (PIRs) was not of a high quality. This was due to UNMA implementing the project, but the PMU reporting the project, there was a slight disconnect.

### 3.2.1 IA and EA Coordination & Operational Management

#### GEF Implementing Agency (UNDP) coordination with the Executing Agency / Implementation Partner

UNDP were the GEF / LDCF Implementing Agency (IA). MoFPED was the Executing Agency (EA), with MWE as the Implementing Partner (IP). MWE delegated implementation to UNMA who with the support of UNDP established a Project Management Unit to operate under UNDP National Implementation Modality, including using UNDP procedures for the procurement of goods, works and services.

#### **Project Inception Workshop & Project Inception Report**

The inception workshop was held in March 2014 with no changes to the logframe proposed.

#### **Project Board (PB)**

The Project Board (PB) was established in March 2014 to meet twice a year with: Members – MWE (chair / Executive), OPM, MAAIF, MoLG, MoFPED<sup>15</sup>, DWRM, UNDP (co-chair); and Ex-officio members – Project Manager (of PMU), Project Coordinator (Director of UNMA). The 1<sup>st</sup> PB meeting was held in April / May 2014 with the adoption of the PB ToR and the 1<sup>st</sup> AWP. Minutes of meetings are recorded: 2014 (Apr and Nov); 2015 (July & Dec); 2016 (Sept & Dec); 2017 (Aug & Dec); 2018 (Feb) - Phase out plan & (June) - Project closing meeting.

Regarding the major decision to agree to five TSAWS, the MTR stated that the PB was coerced<sup>16</sup>.

<sup>15</sup> MoFPED also sit on other boards with donors for example, so they have a strong knowledge of synergies and gaps

<sup>16</sup> MTR p34 – ‘although there is documented evidence that the PB fully participated in the discussions and approval of the purchase of the TSAWS, there remains a feeling that the PB was coerced into agreeing to this expensive equipment, and that they did not fully comprehend the implications of the recurring maintenance cost (US\$261,000 / year)’. From the TE point of view it is also difficult to understand as to why there was so much pressure on SCIEWS / UNMA to purchase this system and why CIRDA was so prominent in promoting this decision.

### **Project Technical Committee (PTC)**

The PTC was established in August 2014 with the membership of OPM (chair), MWE (UNMA & DWRM), UNDP; MAAIF, MoFPED, MoLG, UCC, with the presence of the Project Manager (PMU) and senior supplier (UNDP) required. PTC Minutes of Meetings are recorded: 2014 (July & Sept); 2015 (Mar & Nov); 2016 (June & Nov); 2017 (Mar & Aug – Exit Strategy & O&M; 2018 (May). There are PTC monitoring visit reports for Central-west and North-east teams in June 2017.

The PTC reported to the PB twice a year and was quite effective in finding solutions to bottlenecks, with decisions able to be made as a result.

### **UNDP Coordination**

In June 2013, UNDP conducted a Local Project Appraisal Committee (LPAC) meeting concerning finalization of the Project Document (prodoc). Following CEO Endorsement and prodoc signature in January 2014, a project team leader was recruited in March 2014. The remaining PMU staff were recruited by July 2014 which was a significant delay for a 4-year project. The project was extended by five months from Jan 2018 to end June 2018.

UNMA were satisfied with timely support from UNDP and the operational support provided by the PMU (under NIM), and noted that procurement had been 70% effective.<sup>17</sup>

SCIEWS was noted for being responsive and adaptive to change / issues that arose, with risk being managed. An example of adaptive management, would be the project no-cost extension of six months from 13 Dec 2013 until 30 June 2018, which allowed for the time-consuming procurement of equipment and operationalization to catch-up.

### **PMU operational management & support to UNMA**

Effective partnerships arrangements were established for project implementation. They were established based on agreement of the approved prodoc with its co-financing letters of support from MWE, OPM, MAAIF, UCC as well as from UNDP. The partnerships were administered and guided by the PB, its PTC and the PMU.

The agreement between UNMA and OPM was of prime importance. The establishment of NECOC and their uptake of CI and issuing the EW bulletins was of significant value. Without UNMA and NECOC working together, the project would not have been successful<sup>18</sup>.

From March 2014, the PMU was able to provide operational support to UNMA, DWRM and others. The main issue related to the time needed for the identification of appropriate technologies / equipment and the ensuing procurement. For the former, outside expertise, consultancies were needed and for the latter, standard UNDP procedures take ~3 months. These two aspects together with installation remained the focus for 2/3<sup>ds</sup> of the project duration. Other issues arose particularly as the installation of 28 DWRM AWLSs on public land began<sup>19</sup>,

UCC were fairly active on the PB, in providing advice on CD / CI distribution methods, potential public private partnerships (PPPs)<sup>20</sup>, and supporting the involvement of CIRDA-sourced expertise on PPPs. This was to aid UNMA in developing PPPs with the telecoms sector.

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<sup>17</sup> Due to US\$1m in funds being redirected to EN TSEWS and CIRDA, there were significant budgetary changes in equipment and activities. These changes included: community CI / EWS information and awareness activities being cut including dissemination at sub-county level not being undertaken; awareness for AWLS security and 'local ownership'; and staff training on the maintenance of AWS curtailed; fewer AWS units.

<sup>18</sup> It helped that UNMA and NECOC were located in the same building

<sup>19</sup> There were problems over land suitability (granite rock at 4-5 sites), land ownership, access payments, the contractor's late construction of AWLSs housing units (which is only possible in the dry season, and damage / theft.

<sup>20</sup> UCC facilitated telecoms companies to meet UNMA including through the 2016 PPP workshop



### 3.2.2 Institutional Mechanisms

For the national level, operational partnership arrangements are briefly described in the previous section, whereas this section considers institutional mechanisms<sup>21</sup> and capacity which are the backbone for delivering new policies and services. The next section considers local partnerships / stakeholders.

#### UNMA - Long-range Weather Forecasting

The Directorate of Applied Meteorological & Climate Services within UNMA has the mandate to produce climate products / services and disseminate the information. It manages the NMC data centre.

For international data, UNMA / NMC utilise NOAA and the European centre of satellite data for weather (EUMetSat) to collect data on sea surface profiles for example. UNMA has a daily weather balloon and measures pollution in the ozone layer at 40km.

UNMA products are a: seasonal forecast (made in Nairobi)<sup>22</sup> four times a year; monthly forecast; and a 10-day update. They are all consolidated and include for example agri-advisories, which UNMA's scientists prepare. The original CD is not shared, but rather the CI is 'downscaled' for public consumption. UNMA also produces climate change projections. Under SCIEWS they have produced a CI manual / guidelines (draft) e.g. to explain climate terminology (onset, peak, cessation etc). CI is disseminated via the Uganda Media Centre which is accessible to all media organisations and email.

#### IGAD Climate Prediction & Application Centre (ICPAC)

ICPAC is the East African Regional Centre (Nairobi) which produces seasonal forecasts four times a year. ICPAC receives global climatic data (from the Hadley Centre in the UK Met Office) which handles global weather data (Atlantic, Indian – Dipole & Pacific Oceans – El Niño–Southern Oscillation (ENSO)). With inputs from the East African countries, this CD is then used to make consensus seasonal forecasts across 11 countries in the region.

In a large part due to SCIEWS, UNMA is now able to provide 50% of the needed or required national CI coverage data. Prior to the project, only 30% of this data was sent to ICPAC. UNMA has a desk and computing power to run Uganda's seasonal forecast models at ICPAC.

#### UNMA National Meteorological Centre (NMC) – Short-term Weather Forecasting

The NMC is responsible for CD collection and transmission with a mandate for short-term weather forecasting in particular for the Entebbe airport. The Terminal Aerodrome Forecast (TAF) is for 30 hours ahead and updated every 6 hours. For the Civil Aviation Authority (CAA), storm warnings come via the SigMet system to the airport control tower and to pilots directly. UNMA with SCIEWS support set up Automatic Message Switching System (AMSS), which has contributed to safety of civil aviation<sup>23</sup>.

It primarily uses Satellite 24 for Ugandan weather, which indicates moving cloud cover over Africa<sup>24</sup>. NMC uses forecasting models (UK, French, USA's EN, Null School) which run every 3 hours, but will also provide alerts. NMC has access to the Adcon AWS data with the server (funded by SCIEWS) located at NMC. Manual data comes via the communications room.

NMC is part of a regional daily weather conferencing meeting for Rwanda, Tanzania, Burundi – for the daily forecast which is sent to the media. NMC also provide a 3-day city weather forecast for ten cities. NMC has four staff on three shifts.

#### UNMA and MoU / Protocols

UNMA and DWRM created a data sharing protocol. UNMA has hydromet and agri-met specialists within its organisation, however DWRM has separate water-based monitoring systems including water level sensors

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<sup>21</sup> This section equates with the category for 'partnership arrangements & stakeholder engagement'

<sup>22</sup> E.g. the extended version is a 24-page booklet – e.g. March to May 2017 Seasonal Rainfall Outlook and includes a detailed forecast by region, implications of the forecast, specific advisories by sector & region, and rainfall performance over the preceding period

<sup>23</sup> Adcon with the AMSS was ISO accredited by WMO for international aeronautical use on 6/4/2017

<sup>24</sup> It shows time-series of weather. e.g. last 6 hours and provides short-range storm detection (not TSAWSs). The system used is called SigMet for update every 6 hours and / or on significant change with data logged into the system. Also, the daily forecast at 5PM uses SAT24. It takes about 4 hours to produce this forecast for 5 PM)

and rainfall monitors. The data from these is of use to NECOC and UNMA. Thus, a protocol was prepared with the expectation that by providing water stations with telemetry, real-time data could be accessed. However, due to various issues, the water stations are just becoming operational and the protocol has yet to be implemented, notwithstanding that an MoU for data sharing between the two agencies was agreed in September 2016<sup>25</sup>. The PB meeting (August 2017) indicates that the issue is not the protocol (~MoU), but rather how to operationalise. One recommendation to support this included the housing of the new regional / zonal officers from UNMA at the regional WMZ offices, however the protocol was really designed to work on high level for data, software and instrument compatibility with access-sharing benefits to both parties.

UNMA also has an MoU with the National Association of Broadcasters (signature date unknown).

### **Department of Water Resources Management (DWRM)**

DWRM are part of the inter-ministerial task force (meeting quarterly and *ad hoc* under OPM) and participate in the annual joint sector review forum. DWRM has a new Water Resources Institute. DWRM is in the process of assessing water licensing with the support of UNDP and BRL, a French water company.

The Automatic Water Level Stations (AWLSs) provide data logged information (automatic collection of data in this sense) on water level, flow and discharge. One issue was that due to late installation and equipment security issues, they are not yet linked via telemetry (SIM card cell network) for automatic transmission of data<sup>26</sup>. Due to lack of security (with vandalism reported), DWRM removed the solar panels which were needed to supply electricity for the automatic transmission of data via the SIM-card cell network<sup>27</sup>. At present there is a need to download data from loggers on a monthly / quarterly basis and then re-transmit it from the office, which involves greater staff time.

DWRM has expanded from 20 to 80 AWLS, thus there is now a capacity and cost of maintenance issue (staffing, calibration and spare parts). An O&M manual has been produced.

In terms of catchment planning, there are four water management zones namely Kyoga in the east, Upper Nile, Victoria in the South western and Albert in the western region. DWRM plans to decentralise activities to these zones. E.g. the Kyoga water resources management office administers 11 sub-plans which cover water availability and stakeholder needs (e.g. irrigation vs hydropower vs value to national economy vs priority government policy). The four regional offices manage the DWRM water stations and collect data. There are 'catchment management committees' with district leadership and one elected council official to support awareness and act as an ambassador.

### **Office of Prime Minister - Department of Disaster Preparedness and Management, (OPM, DDPM)**

OPM was integral in the design of the project and understood that once 75% of the US\$4m GEF budget was to be for equipment, then UNMA needed to be brought on board to undertake Outcome one with DWRM and that OPM and MAAIF would focus on Outcome 2. OPM chaired the PTC, and one UNMA meteorologist sits in NECOC to facilitate access to UNMA CI. Before the \$28m SCIEWS project, there wasn't a NECOC or AEAS, thus the CI / EWI dissemination gap has been partly filled as a result of the project.

During project implementation, OPM / NECOC used an 'administrative request system' with UNMA (as opposed to a protocol) to facilitate sharing information, which worked well in terms of obtaining climate data. However, there remain technical issues in obtaining data from DWRM.

SCIEWS also provided 28 Smart phones to districts following a forerunner UNDP project. These support the EWI link from district CAOs to the OPM permanent secretary.

In order to raise the profile and activity of local government, including for disaster risk management (DRM) information flow and disseminating CI / EWI, the GoU has revised the pay grade of parish chiefs from U8 up to U5. Through SCIEWS, OPM has provided routine budgeting for EWSs including training at district level.

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<sup>25</sup> A Nov 2014 protocol was drafted, but remained unsigned. A set of SOPs for ICT were developed to represent the MWE/UNMA/DWRM, however they remain dated from Nov 2014, but unsigned. A collaboration agreement between the institutions of GoU in hydro-met services for enhanced EWS (2015) 29pp – was unsigned. A Cooperation Agreement between UNMA and DWRM concerning data, information and knowledge (11pp) is undated but appears to be from 2017 (unsigned)

<sup>26</sup> Late to install AWLS due to wet season project start, issues with contractors on government land / land acquisition, capacity to install, consultant late to calibrate & need to train DWRM staff on installing new AWLSs

<sup>27</sup> In some cases, DWRM is using a rechargeable batteries with a monthly recharge

Also, every district now has a dedicated IT / communications officer to provide the NIEWS<sup>28</sup> and other EW bulletins for parish leaders. With climate change and disaster management rising in political importance and with this department and centre being directly under the OPM, it has been comparatively well funded.

One of the functions of NECOC is to get the CI / EWI to local levels. The local institutional mechanism (which has been strengthened under SCIEWS) is to utilize the Chief Administrative Officer / District Disaster Management Committee (CAO / DDMC) which has been given greater powers under the MoLG to disseminate and collect parish level CI / EWI.

District hazard and risk profiling<sup>29</sup> and mapping (see map) has been undertaken by NECOC.

### **OPM, National Emergency Coordination and Operations Centre (NECOC)**

NECOC was set up October 2014 to collate, analyse, package and disseminate EWI. It has been very active since 2016. NECOC provides risk information and profiles, EW bulletins (21 so far, with the last 16 being consecutive), advisories, SMS alerts. The subject matter includes climate information, early warning information (e.g. flood or storm alerts), agricultural information – crops and livestock – linked to seasonal rain, drought, disease and pestilence etc, and health. It generates data from open sources and analysis of data from UNMA, which it also has direct access to AWSs – 12 synoptic stations' data for example<sup>30</sup>. Open sources include remote sensed data from NASA.<sup>31</sup> Agriculture data is obtained from MAAIF<sup>32</sup>. It triangulates the data to produce the monthly National Integrated Early Warning System (NIEWS) bulletin. Its emailing list has grown from 500 to 7,000+. It also produces a weekly health alert package. It is able to send SMS bulk message alerts up to 65 characters (i.e. cell broadcasting via the MTN telecoms network). Key recipients of this information are the district DMCs via the CAOs. It is then provided to local farmer organisations for example. Outputs are generally consolidated into the 11 sub-regions with a view to be translated into a further five languages in the future.

NECOC have standard operating procedures for emergencies and liaise closely with the military. They have a mobile response vehicle. CAOs are linked to the NECOC emergency room and the OPM commissioner.

NECOC limitations include: training on climate modelling and flood EWS is a bottleneck.

**Hazard, Risk and Vulnerability Map<sup>33</sup>** - Tororo District with rivers and color-coded flood risk indicated

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<sup>28</sup> Partner meetings are held to 'downscale' the information into NIEWS for public consumption

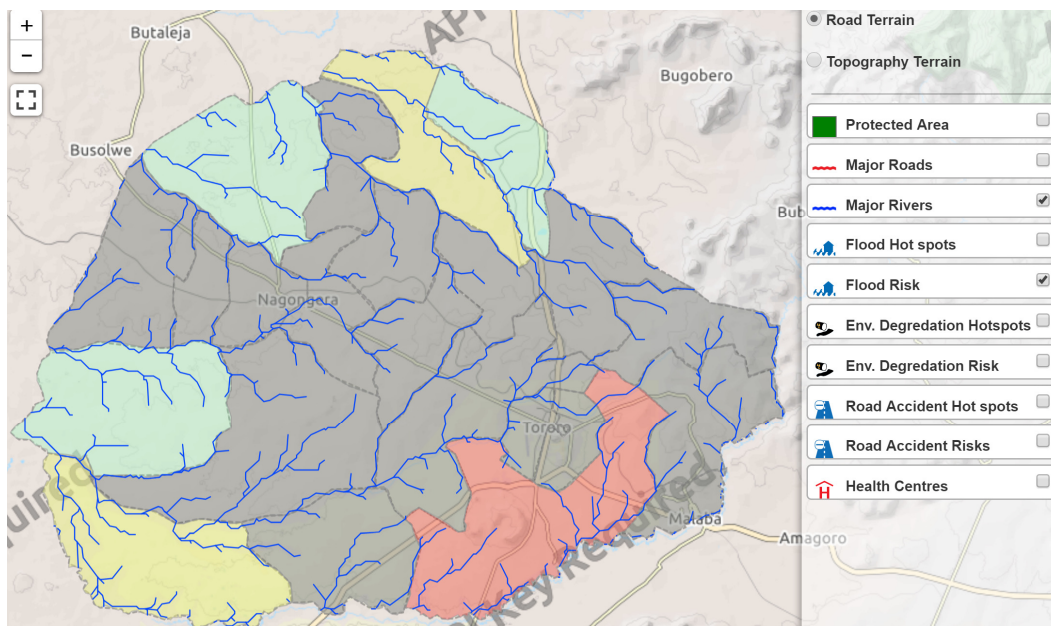
<sup>29</sup> Produced with support of UNDP under an OPM / DRPM project. E.g. Teso Kumi District Hazard, Risk & Vulnerability Profile (2014)

<sup>30</sup> At present it would like to receive the localised real-time hydro data from DWRM to inform flood / drought warning.

<sup>31</sup> JPL system data on soil moisture, surface flow, epidemics, refugees, crop & pasture etc. Data from NASA also includes weather data – hail, wind, thunderstorms etc. NECOC has no access to TSAWS Storm detection equipment. It also uses GLAM - Global Agriculture Monitoring and GEOGLAM, which is funded by NASA. African drought monitoring data is also open source (standard precipitation forecast (SPF), soil moisture etc) which can be access from [princeton.edu](http://princeton.edu).

<sup>32</sup> E.g. on crops and pasture such as the Lake Tanzania cattle corridor. Also receive information from NARO on crop pests etc - Fall Army Worm (actually the larval stage of a moth)

<sup>33</sup> Uganda Disaster Risk Information Centre, Department of Disaster Preparedness and Management, National Emergency Coordination and Operations Centre <http://www.necoc-opm.go.ug/eastern/tororo/tororo.html>



### MAAIF / Agricultural Extension & Advisory Services (AEAS)

Agri-advisories are disseminated from MAAIF via the Directorate of Agricultural Extension Services (DAES) to the District Production Departments and down to the agricultural extension officers at sub-county level. The District Production & Marketing Officer technically reports to DEAS, although is administratively responsible to the Chief Administrative Officer (CAO) under a decentralized arrangement.

The role of MAAIF under SCIEWS has been limited due to the extent of agriculture related outputs under Outcome 2 being limited by design. In brief, this included inputs to: risk mapping in Teso and Mt Elgon; and communication for alerts / advisories strengthened at a local level. Thereafter during implementation, the budget for Outcome 2 was also substantially reduced. It should also be remembered that the original title of project was ‘Strengthening climate information and early warning systems in Africa for climate resilient development and adaptation to climate change – Uganda’, however this was reduced to SCIEWS with the ‘climate resilient development and adaptation’ implied only and not part of any implementation activities on a local agricultural level.

Added to this, the organizational structure of AEAS is quite complex, with many groups of ‘partners’ at differing levels with various lines of communication (formal management / technical, collaboration linkages, statistics and information flows), that are not all directly linked with partner groups<sup>34</sup>. The main axes that could be strengthened are the DAES – MAAIF agencies (inc. NARO) – District Production Department triangle linked to the District Production Department – District Farmer Organisations – Non-state Actors (in the value chain) triangle.

Under SCIEWS, MAAIF’s confidence to provide CI and agri-advisories has improved. The accuracy of the CI has improved, as have the forecasting skills of UNMA, which together with MAAIF agri-experts’ cropping knowledge, the quality of inputs directly for (D)AEAS or via NECOC has improved the detailed seasonal forecast<sup>35</sup>. The direct linkage of MAAIF to AEAS started in 2017 (previously via National Agricultural Advisory Services) with the mandate to provide agri-advisories down to district production office level. MAAIF has provided expertise for SCIEWS training courses.

### National Agricultural Research Stations (NARO)

<sup>34</sup> MAAIF Extension Guidelines & Standard, June 2017, p19, Fig. 1 Organisation structure of National Agricultural Extension Services

<sup>35</sup>The MAAIF planning unit handles early warnings. And receives seasonal forecasts from UNMA. They provide advisory messages and mitigation measures for crops, livestock and fisheries. In the middle of the growing season crop, livestock and fish monitoring takes place. A post-harvest assessment is also carried out. Data analysis is carried out at the national level with an IPC working group which includes the MAAIF, FAO, WFP, Makerere University and other key actors. The dissemination of the information takes place via advisories twice a year through newspapers and emails to local government, as well as via local radio. MAAIF has a challenge in getting the data from the field for analysis. Source - Evidence on Demand Report (2016)

NARO has nine zonal agricultural research institutes across Uganda, inclusive of specialisms such as for crop variety centres (maize, cassava), for livestock and fisheries. The Lira zonal station covers 16 districts in their zone which encompasses five agro-climatic sub-zones (transition from Karamoja; higher rain area; Ngoro rain catchment; para plains area; lake shores region which is drier).

For research<sup>36</sup>, NARO on a three-monthly basis, collates its station-specific rain data and that of UNMA generally for the region to match to these five agro-climatic sub-zones. However, they are not at present using CI that is more accurate based on the present coverage of UNMA AWSs, which could be matched more specifically to these five sub-zones and / or the 16 districts. This indicates that the transfer of these new technologies under SCIEWS has not been fully achieved, even to a research station housing one of the Adcon units<sup>37</sup>. The NARO also uses Tahmo data, which is not necessarily accurately matched to location, but just provides data from nearest station, one of which is located at the Lira zonal station.

UNMA forecasts are received directly to NARO which are used in research trails<sup>38</sup>

The climate in the region has been erratic for both seasons recently with higher intensity periods (e.g. 140mm in 2 days) followed by higher number of 'dry' days. This makes monthly rainfall data less useful for research.

### 3.2.3 Local Partner / Stakeholder Engagement

This section focusses on local government engagement in the process of CI dissemination and feedback, and demonstrates how differing departments and offices use differing methods to achieve their aims. This section also highlights the present status and shortfalls in CI delivery and response, taking five project districts as examples. The section indicates the large effort made in mobilising District Disaster Management Committees (DDMCs) to utilise CI bulletins such as 'NIEWS' issued by NECOC, but on the converse side, how the technical nature of the CI makes its take-up at lower levels more problematic.

#### District Government and District Disaster Management Committee (DDMC)

Taking Gulu District, as an example, a District Disaster Management Committee (DDMC) has been established<sup>39</sup> and meets quarterly and has three sub-committees for: food & agriculture livelihoods; works & technical services; and social services. The technical committees meet monthly for planning with sub-county (extension) staff and to review NIEWS bulletins for example. The DDMCs are now more supportive of CI / EWS coordination (and also report up for IPCC COP meetings).

The information channel to local government is via the Resident District Coordinator (RDC), the CAO, and then to the DPD via email. The secretary of the DDMC at CAO office has a modem and Smart phone. The district has a natural resource management (NRM) office with an environment officer with concerns such as flash floods, alerts to clear culverts, local drainage channels etc

Dissemination methods include: Sub-county office with internet and extension worker equipped with a Smart phone; Parish Development Committees (PDCs); Community-based Facilitators who supplement the PDCs and are briefed on SCIEWS; district farmers association; and local farmers group contacts (which can be crop / livestock type specific); radio with high listenership for CI advisories / bulletins during the morning news and weekly agriculture programme.

Taking Tororo District as an example, the district disaster management committee (DDMC) meets monthly and is chaired by the CAO. It was set up as result of SCIEWS training, indicating capacity is being built. The DDMC and EW actions have been integrated into district development planning (5-year plan 2012/17), resulting in a 'district disaster contingency plan' with a district-level designated person for CI.

Monthly CI bulletins are received and transferred to the Parish Development Committee (at Local Council Level 2, with an elected official, the Parish Chief) who then provide to the Village Chief (LC1, which is also salaried with a bicycle provided). However, the link needs strengthening. Greater interpretation of this CI at the local level is also needed (i.e. interpreting technical language, making it district-specific and in the written

<sup>36</sup> E.g. drought tolerance of maize varieties / Phaseolus beans – receive new varieties to test on-station and on-farm.

<sup>37</sup> The UNMA representative M. Waiswa provided the Adcon data webpage to the director of the NARO station after the meeting

<sup>38</sup> District calls meeting with farmers to air farming constraints which are prioritised (beans flowering but then drying out – so adaptive trials from NARO – back down to sub-county / farmer, then fine tune trials.

<sup>39</sup> Members include the OPM, int'l agencies, CSOs, NGOs. DDMCs were originally established in 1996 due to war, but have been re-invented under SCIEWS

language (English to local)<sup>40</sup>. Monthly radio airtime is also allocated to get climate / EWI messages down to sub-county and village level. In addition, the Parish Chief has to report quarterly up to the NRE office on environment and climate matters, which is reported up via the Resident district commissioner (RDC) to the OPM. UNMA also shares CI to the NEMA (Environmental focal point person at every county), but is sometimes slow to share the CI. The DPD and the AEAS also functions at district level covering crops, livestock and fisheries.

### **District Production Department (DPD)**

Taking Gulu District as an example, the DPD is now receiving CI / EWI more regularly (weekly, seasonal) and on time. The CI is targeted at the sub-region level (~8 districts). A military representative is integrated into the district production office for state seed distribution under 'Operation Wealth Creation'. There is added technical support from MAAIF. The dissemination of CI is now more pro-active and operational, and is also cross sector.

Taking Jinja as an example, the DPD receives a monthly CI forecast, plus newsletter from MAAIF, including via WhatsApp. To disseminate, they print for sub-counties (although the bulletins are colour-coded and do not print well in B&W), and use local radio. The interaction with MAAIF is a little weak. The CI and agri-advisories are integrated into planning advice. E.g. don't plant perennials (e.g. coffee, cocoa) in 2<sup>nd</sup> rain season, but annuals (maize, beans), however farmers tend to plant their own seed first, then use state-planned seed which can arrive late(r), and be of less interest. The office has general guidelines from MAAIF, including how to make own rain gauge.

Taking Mayuge District as an example, it has 36 extension workers in 14 sub-counties. Some staff are trained in CI. It is estimated that still only 5-10% of farmers receive CI, despite SCIEWS and the efforts made so far. Farmers know the climate has changed (e.g. Nov-Dec hail storms), so they now seeking CI and adaptation methods (shorter rotation crops / intercropping with maize etc)<sup>41</sup>. There are concerns that the CI is not district specific. The seasonal forecast has been received two weeks prior to the onset of rains for the two Kyoga sub-regions (northern and southern). The DPD officer receives monthly CI via email, although it was not received for the last two months. The bulletins are transmitted to sub-county via email and from their it is printed out and should be put on a notice board<sup>42</sup>. The DPD can get CI directly from UNMA.

### **Sub-county Government / Extension Service**

Taking Jinja District Mafubira Sub-county as an example, the Extension officer indicated that seasonal forecasts were received and used. The office utilizes farmer groups (maize, banana, cassava, coffee) for dissemination. The extension team (agri / vet / fisheries) provides training in August.

From the farmers' point of view the follow weather situation exists: The rainy season is usually March - June and August – December. However due to rains continuing through to mid-July (U-NIEWS Eastern Lake Victoria, Jinja rainfall), the farmers wish to know if this will affect the onset of the next rainy season. After the March plant, what is the risk if groundnut is planted again in July instead of waiting until August rains? Will there be a long wet or dry spell, which affects pests such as the Fall Army Worm (actually a moth)? For August – December, there is climate change, with rain more intermittent and more intense periods. In 2017 there were rains in July-Aug (which allowed early and not so early planting), but it was dry in September before rains again. Thus, will the pattern for 2018 be the same?

Thus, the difficulty is that the extension officers need to understand how specific or tailor-made the CI is for their district farmers, and do the seasonal forecast projections answer the farmer questions regarding the duration of the present rainy season and the onset of the next season<sup>43</sup>.

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<sup>40</sup> The anecdotes for Tororo were that within seasonal flood prediction areas, farmers still planted inside these river flood zones resulting in crops being washed away. However, farmers take the risk as for the previous three years, there had been no floods; and that there was an alarmed river flood warning system for Manafwa, however, the loud siren was not appreciated.

<sup>41</sup> They also need to know the onset of the rains, to inoculate livestock against the Tsetse fly protozoa to avoid Najana in animals and sleeping sickness in people.

<sup>42</sup> The budget for the SCIEWS notice boards was cut

<sup>43</sup> Farmers also use their own forecasting methods – such as when termites take to wing as an indicator or sufficient soil moisture. Important cropping factors include early land preparation; planting time; good seed bed; weeding; moisture contents.

The TE would suggest that further local level training on the interpretation of seasonal CI agri-advisories, and access to more detailed MAAIF and UNMA<sup>44</sup> information is needed.

### Catchment-based Water Resources Management Planning (CbWRMP)

Taking Kyoga Water Management Zone (WMZ) as an example, catchment management committees have been established at district level with an overseeing technical committee, sub-catchment committees (with entry point at sub-county level), and micro-catchment committee (which are parish-based). The Kyoga WMZ has 11 CbWRMPs covering 52 districts. One plan for example for Awoja Catchment has 14 sub-catchments, with three out of 14 sub-catchment committees formed with five draft plans produced so far. CbWRMP guidelines are being used to prepare the plans which include for example collating historical data, and making a water resources assessment (floods, drought, water balance, competing uses). Sub-catchment committees are linked to CI / EWI alerts and advisories system via local government.

The list of key stakeholders is described in **Annex 9**.

### 3.2.4 Finance & Co-finance

#### UNDP Financial management

The PMU used the same UNDP financial management system (Atlas), for ease of planning, procurement and spending. Under the NIM, fund disbursement by UNDP was via the PMU upon letters of request from UNMA. This included approval by the CO Country Director for use of the project vehicle for example, so in effect disbursement was managed by UNDP, and the IP managed the actual project implementation. Initially in 2014/15, there were 2-3 advances that UNDP made to the project account, with the 'Harmonised Approach to Cash Transfers (HACT) system used for quarterly monitoring. However, this stopped in favour of direct requests which were faster and more efficient, and this worked well for the remainder of the project.

#### Finance

The breakdown of planned and actual expenditures by year is provided in **Annex 4**. In summary the disbursement of GEF funds is given together with UNDP TRAC funds:

Year	GEF Disbursed	TRAC (\$)
2014	\$256,947	19,956
2015	\$1,049,851	49,712
2016	\$1,586,799	51,444
2017	\$937,000	228,151
2018	\$168,000	23,889
<b>Total</b>	<b>\$3,998,597</b>	<b>373,152</b>

The GEF budget was effectively 99% spent by the end of June 2018. At the time of the TE, there remained a few outstanding expenditure items for the consultants' TE costs, and invoices totalling US\$50,106 (including US\$12,189 as retention funds)

#### Due Diligence - Audit Reports

An audit in was undertaken in 2016 (and reported in March 2017) which rated SCIEWS as accountable and transparent (Final Report, 2018). It covered January 2015 to December 2016, i.e. the 1<sup>st</sup> two years of the project. The audit management letter indicated that there were no MoUs between the IP and RPs contrary to the requirements of the prodoc.

The ISO certification of the synoptic AWS and the AMSS was achieved following the quality assurance and audit by the Kenya Met. Department.

#### Co-financing

SCIEWS supports applied learning and application in CD and CI services as part of the GoU needs. So it is not so much a case of co-financing / counterpart funding to SCIEWS, but rather SCIEWS is supporting and integral to the success of the overall objectives which are shared.

<sup>44</sup> e.g. Adcon telemetry data is on-line and covers rain patterns for the last three years

A breakdown of co-financing is provided as **Annex 3** with the summary also evident under **Exhibit 1**. To note, co-financing contributions, either as direct support funds (grant or in-kind) or as complementary funds (e.g. linking up with similar project in a neighbouring area), are not usually accounted for under GEF methods, with only the GEF funds audited.

The table indicates a summary of the co-financing of the main government partners

Partner	Committed endorsement	at	Expected to be realised by completion	%
UNMA	\$6,000,000		\$7,000,000	117
DWRM	\$2,800,000		\$1,700,000	61
OPM	\$1,500,000		\$1,000,000	67
MAAIF	\$1,000,000		\$1,200,000	120

Also, as noted in the table above the UNDP TRAC funds utilised by the project are accounted for.

All project partners reported that the extent of co-financing had been excellent in terms of funds grant or in-kind and in terms of concomitant physical inputs of stakeholders. Part of the result of this, was that the reported level of project ownership which was noted to be very high.

**Annex 3** – 2<sup>nd</sup> table indicates the manner of involvement of the co-financing partners. For example, OPM considered their 5-year plan in relation to SCIEWS and holistically costed their co-financing contribution at \$15m.

### 3.2.5 M&E Systems – Design & Implementation

M&E Systems – Design & Implementation
<p><u>Overall quality of M&amp;E – Moderately Unsatisfactory</u></p> <p>Due to the short coming of not setting up an M&amp;E system, feedback and adaptive management was slower than expected. This impacted on the project in that it continued to have an equipment focus into year three, when other activities should have come more to the forefront earlier in the project cycle (e.g. training the next generation of weather analysts, bring MAAIF into the project)</p> <p><u>M&amp;E at Design - MU</u></p> <p>SCIEWS didn't set up a monitoring system at the start, this it was unable to clearly see or report its results in a systematic way.</p> <p><u>M&amp;E Implementation - MU</u></p> <p>Without an M&amp;E system, the project was unable to report effectively with respect to a number of indicators, nor had the ability to feedback effectively on progress, such as dissemination of CI within the districts and its uptake.</p>

#### Project M&E systems

A national M&E Associate was engaged for the last nine months of the project in order to collate results and feed into the 2018 PIR and PMU Final report 2018 for example. The person also prepared publications & visibility items. The earlier prepared M&E Framework (March 2015) was not effective in providing a workable M&E system.

The standard UNDP GEF reporting system was established with the PMU responsible for quarterly and annual reports with plans. In addition, the PTC reported biannually to the PB who met biannually. This latter PTC / PB relationship with the addition of annual plans / budgets was the mainstay for project oversight.

UNDP has a separate project management unit which provides additional M&E support, such as logging the MTR and TE on the UNDP Evaluation Resource Centre webpage.

Issues with annual reporting occurred due to the GEF PIR / GoU reporting period of July - June<sup>45</sup> being out of sync with the UNDP Jan – Dec calendar. Thus, in effect, the project reporting shifted to an 'annual style'

<sup>45</sup> There was some discussion as to whether the 2018 PIR, by the time of the TE in July 2018 was in fact the final PIR which was only due in September 2018.



report every six months.

All the partners followed the results framework/ logframe as an M&E management tool.

Apart of the M&E systems, both MTRs and TEs were undertaken. The MTR was accessed by the TE in order to assess project development specifically before and after the mid-term period.

### GEF Tracking Tool - AMAT

The GEF tracking tool is the Climate Change Adaptation - LDCF/SCCF Adaptation Monitoring and Assessment Tool (AMAT)<sup>46</sup>. Only two indicators were completed for the AMAT tool. These were: the number and type of monitoring systems; and the number and type of institutions with increased capacity to reduce and respond to climate risk

Indicator	End of project	Target	Baseline
Type / No. of monitoring systems	25 (20 Adcon <sup>47</sup> , 5 Earth Network)	36 AWSs	6 AWSs
	28 (12 synoptic, 7 Agromet, 9 Hydromet)	44 (synoptic, agro / hydro-met stations)	12 (synoptic, agro / hydro-met stations)
	28 Telemetry houses constructed	75 surface hydromet stations	35 surface hydromet stations
	16 Automatic Water Level Stations	16 AWLSs	0
	1 Automatic Message Switching system	0	0
No. / type of institution with increased capacity to reduce risks and respond to climate change	2 Implementing Partners: UNMA and DWRM	0	0
	2 Responsible Parties: DDPM / OPM & MAAIF	0	0

The AMAT tool included other indicators which could have been monitored and included:

- Risk & vulnerability assessments (Indicator 2.1.1/2) – NECOC has produced profiles and hazard & vulnerability maps for all 121 (previously 112) districts
- % of population covered by climate change risk measures (Indicator 2.2.2) - This equates with the project indicator 2.1 – ‘% of population with access to improved climate information’ – see Annex 1 – this could be added into the AMAT table, even though the survey was from 2016.
- % of population awareness of predicted adverse impacts (Indicator 2.3.1). This indicator is on a simple 1-3 scale
- Other indicators for adaptation technologies and policy / regulatory frameworks improved on simple scales 1-5.

### 3.2.6 Adaptive Management (Work planning, Reporting & Communications)

#### Work planning (AWPs)

Workplans and budgets were prepared for: 2014, 2015, 2016, 2017, and Jan-Jun 2018. Annex 3 indicates that project spending followed a normal ‘bell-shaped’ curve for expenditures slow at project start, rising sharply and tailing out towards project closure. Also, the differences between annual budgets and expenditure were within normal patterns

#### Reporting and Project Implementation Reviews (PIRs)

Annual reports produced by the PMU include: Apr-Nov 2014; Jan-Dec 2015; Jan-Aug 2016; Jan-Dec 2017; Final Report June 2018.

Four PIRs were produced (2015, 2016, 2017, and in 2018). The TE mainly reviewed the 2018 PIR which was considered adequate, but lacked adherence to the logframe in places (e.g. no mention of sector policies and

<sup>46</sup> [www.oecd.org/env/cc/48332185.pdf](http://www.oecd.org/env/cc/48332185.pdf)

<sup>47</sup> The Adcon AWS transmits to UNMA every 15 minutes via remote telemetry (trade name for unit addWARE). i.e. it auto-transmits data via GSM / GPRS with a SIM card. The weather parameters are rain, temperature, sunshine, evaporation (derived), wind direction / speed. It also transmits globally at the three synoptic times and produces a routine weather report every hour. Sometimes Adcon automatic rain gauge may not discharge, so has to be manually reset. Such aberrations in data are also being spotted by NECOC, which indicates how pro-active NECOC is. In a significant number of cases, manual instruments have lost functionality or have been superseded by AWS instruments. Other manual parameters that can remain useful include soil temperature.

development plans with CI incorporated (Outcome 2.2), or DWRM finance before and after project (Objective level indicator 2).

On occasion, the reporting by UNDP was exaggerated: PIR 2018, under the Communicating Impact section – ‘The new weather monitoring systems have translated into saving lives, building better livelihoods for smallholder farmers, and enabling climate-smart decisions. This has boosted Uganda’s agricultural productivity, and is driving economic development.’ These are rather large claims to make at this stage.

### Communications

Communications within the project were considered good, especially in having a PMU to support UNMA in the implementation of the project and liaise with UNDP. What UNMA did not do was prepare any specific project implementation agreements with the other responsible parties apart from with OPM with whom an ‘administrative request system’ was used. This meant that despite representation on the PB, the other parties tended to follow the lead of the chair (MWE) and the project coordinator (Director of UNMA), and in the case of the PTC, it was chaired by OPM. Thus, the impression is that DWRM and MAAIF tended to be more passive partners in the project<sup>48</sup>.

Also, as the UNMA mandate was to deliver CI for national and district level consumption, it was left to OPM with the support of MoLG and district government to deliver a mechanism to transfer CI / EWI to sub-county, parish and village level.

## 3.3. Project Results

The TE analysis was undertaken at three levels of the project results framework - Objective, Outcome and Output. This was guided by the indicators and targets set at each level. Success is also built upon achievement of the Outputs, according to ‘framework logic.’ The Objective and Outcome levels include a rating according to UNDP GEF guidance as described in section 1.5.

The IP provided two tables:

- Progress towards Objective and Outcomes (Indicator-based) which is described in **Annex 1**, and
- Progress towards Outputs which is described in **Annex 2**

According to TE guidance, these tables were rated and commented on. Further text is now detailed.

### 3.3.1 Overall Result – Achievement of Objective

#### Objective at the Objective Indicator Level (Overall Result)

**Objective:** To strengthen the weather, climate & hydrological monitoring capabilities, EWSs and information for responding to extreme weather and planning adaptation to climate change

The **overall TE Rating** for these two indicators is **Satisfactory**<sup>49</sup>

**Justification:** There were two indicators individually rated:

- Capacity Scorecard – Satisfactory
- Finance committed to monitor climate - Satisfactory

There were two indicators at objective level.

#### UNDP Capacity Assessment Scorecard<sup>50</sup>

Baseline score 77; Target score 143 (prodoc results framework, p70); Result 135.5. This equates to 95%

<sup>48</sup> The PMU view differed slightly from the TE in stating that ‘the DWRM actively worked with the PMU almost on a daily basis. Even MAAIF was fairly active in liaising with the end users of the weather products at the sub national level, despite the limited budget assigned to them from the project. It is only UCC that tended to be less active probably due to their merely quality assurance / compliance role regarding communication of products from the project’s partners.’

<sup>49</sup> The grading at the project objective level depends on both achievement of outcomes according to ‘framework logic’, and on the objective level indicators which separately consider the long-term impact.

<sup>50</sup> The full scorecard was not available, however the table and information from the PIR were provided.

The project scorecard as a % of the target (2016-18):<sup>51</sup>

	Target level of capacity	Level by June 2016	% Achievement	Level by June 2017	% Achievement	Level by June 2018	% Achievement
Capacity to produce information	51	41	80	47	92	50.5	99
Capacity to package information	36	25	69	32	89	35	97
Capacity to disseminate information	36	36	100	36	100	36	100
Capacity of Legislative & Governance	16	12	75	13	81	14	88
<b>Total</b>	<b>139</b>	<b>114</b>	<b>82</b>	<b>128</b>	<b>92</b>	<b>135.5</b>	<b>97</b>

The UNDP scorecard presented the following figures with PMU attribution added. (see **Annex 1**, Indicator 1 for more details):

- The capacity of agencies to create CI / EWI increased from 80 to 99% from 2016-18. This has been attributed to AWS management, exposure to the South Africa Weather Services and in-house training
- The capacity to package CI / EWI has increased from 69 to 97% from 2016-18. This has been attributed to in-house training of UNMA and DWRM staff by suppliers of weather equipment, and a Quality Management Expert from the Kenya Met. Department
- The capacity to disseminate information has remained at 100% for UNMA<sup>52</sup>.
- The capacity of governance increased from 75 to 85% from 2016-18. This has been attributed: monthly participation in the national / district platform for Disaster Risk Reduction (DRR), exposure of district leaderships to CI / EWI bye laws; and increased budget for EW in district development plans, particularly in the 28 pilot districts<sup>53</sup>

UNMA clearly built capacity as the project went along. UNMA trained and used their existing staff, taking a little time to learn the new systems' O&M, but this was achieved and integrated into UNMA standard work patterns. E.g. for new equipment, it was first installed by the manufacturers or agents, but with UNMA learning so that after each first batch, UNMA could install and maintain themselves.

### Finance committed to UNMA, DWRM & relevant institutions to monitor weather & climate change

Baseline - Annual budget of US\$1.5m & \$0.45m allocated to UNMA & DWRM resp.; Target - 20% increase.

Result:

- UNMA have a 360% increase in budget (US\$9.0m in 2018/19; US\$8.4m in 2017/18; US\$6.2m in 2016/17; US\$2.5m in 2014/15) (source PIR, 2018)<sup>54</sup>
- The UNMA Strategic plan and their SCIEWS O&M plan for the project hydro-met infrastructure describes 3<sup>rd</sup> party revenue generation as part of the project exit strategy
- In June 2018, DWRM presented a costed maintenance budget for their AWLSs, however government planning and finance was already completed by this time, plus MoFPED budgets on a 3-year rolling basis. This means that the earliest that the project AWLSs would be included for O&M would be the 2021-22 financial year. This is a major oversight by the project, and should have been confirmed as part of the original co-financing for the project.

The appearance is that whilst the newly formed UNMA is being heavily invested in, comparatively DWRM is struggling. It is assumed that the newly planned flood modelling unit will re-vamp its fortunes. Also, for DWRM, there appears to be a missing link between catchment-based planning (DWRM) and hazard mapping (NECOC).

### 3.3.2 Effectiveness – Achievement of Outcomes 1-2

#### Effectiveness - Outcome 1 at the Outcome Indicator Level

<sup>51</sup> PMU table (Final Report) indicates a reduced target of 139 as opposed to 143, hence the different 97% achievement figure given

<sup>52</sup> DWRM installation of the hydro stations was only completed a May 2018, and so is excluded from this figure.

<sup>53</sup> The TE was unable to fully verify this last point

<sup>54</sup> Anecdotally during the TE stakeholder workshop, UNMA gave the following annual figures: US\$1m before project, now US\$6m (2018/2019) +~\$4m (in external donor funds) = \$10m / year. This would achieve targets set in the NDPII.

**Outcome 1: Enhanced capacity of UNMA & DWRM to monitor & forecast extreme weather, hydrology and climate change**

The overall TE rating for these two indicators is **Satisfactory**

**Justification:** The two indicators are individually graded:

- % coverage of climate/weather and hydrological infrastructure – The indicator had five targets which were rated as Satisfactory, Moderately Satisfactory, Satisfactory, Highly Satisfactory, and Moderately Satisfactory
- Frequency and timeliness of climate-related data – The indicator had five targets which were rated as Satisfactory, Satisfactory, Satisfactory, Satisfactory and Moderately Unsatisfactory

**Outcome 1: Enhanced capacity of UNMA & DWRM to monitor & forecast extreme weather, hydrology and climate change (two indicators)**

**Percentage of national coverage of climate/weather and hydrological infrastructure**

See table for baselines, targets and results

Coverage	Baseline	Target	Result
UNMA - AWS coverage (synoptic, agro / hydro-met)	10%	47%	29%
DWRM AWLSs and Surface hydrometric stations coverage	Total 28% AWLSs 4% Surface hydro-met 24%	Total 50% AWLSs 19% Surface hydro-met 50%	~50%

Source PIR 2018. Note. 1. The indicators for units of equipment were repeated at the output level, so are presented there

UNMA's Chief Meteorologist gave the national coverage of AWSs at 29% (which is also the figure given in the UNMA strategic plan), with one station able to capture CD representative of at least two districts. SCIEWS has contributed 63% of AWSs in the country; GIZ/USAID 37%. 46% of districts have rain gauges

**Frequency and timeliness of climate-related data**

See table for baselines, targets and results

Frequency of data	Baseline	Target	Result
<b>Transmission</b>			
UNMA – Synoptic station frequency	Hourly	Hourly	Quarter hourly
DWRM – data frequency	weekly to monthly	Every 6 hours, Every 2-4 hours for flood prone sub- regions	Automatic transmission is an issue due to lack of telemetry in operation
<b>Alerts &amp; Advisories</b>			
UNMA Agro & hydro stations	Monthly	Decadal (every 10 days)	Decadal (usually)
Seasonal forecast advance warning	A lead in time of < two weeks	A lead time of 2 weeks	A lead time of 2 weeks
Monthly weather forecasts	Not issued	Monthly	Monthly
Monthly Agro-met Advisories	Not issued	Monthly	Monthly
DWRM – input to NECOC Alerts (flood / drought warning)	weekly to monthly	Every 6 hours, Every 2-4 hours for flood prone sub- regions	Advisories are being generated on an <i>ad hoc</i> basis from the 16 AWLSs

Source PIR 2018

Over 40% of CD / CI is being generated and is being provided to interested parties. The UNMA monthly forecast is not always formally issued, but sent to those who need it, such as NECOC who then disseminate the important aspects<sup>55</sup>.

**Effectiveness - Outcome 2 at the Outcome Indicator Level**

**Outcome 2: Effective use of hydromet and environmental information for making EWs and long-term development plans**

<sup>55</sup> This also applies to the Decadal. e.g. 1-10th July sent on 3rd July, but 11-20th July bulletin was not produced formally due to UNMA's high scientific presence at the National Agriculture show in Jinja, so some capacity issues remain

**The overall TE rating for these 2 indicators is: Moderately Satisfactory**

**Justification:** There are two indicators individually graded:

- % of population with access to improved CI & drought, flood & severe storm warnings – Moderately Satisfactory
- Sector-specific policies, budgets & development plans that integrate CI – Moderately Unsatisfactory

**Outcome 2: Effective use of hydromet and environmental information for making EWs and long-term development plans (two indicators)**

**% of population with access to improved CI with drought, flood & severe storm warnings**

See table for baselines, targets and results. The project baseline survey of 2016 still applies. To note 74.6% of households reported crop farming as the main livelihood activity.

Indicator	Baseline	Target	Result
% of population with access to improved CI with EWI	3% men & 3% women	12% of men & 12% women	% households received EWI from radio (72%); SMS Message (0%) % households received CI: radio (51%); television (4%); no information (48%)
Frequency of Update			37% receive updates seasonally at least 14% receive monthly updates
Timeliness of EWI			74% of households reported EW forecast for future month(s) 75% of households reported that EWI was timely, with 59% of households facing temperature disaster reported timely EWI 91% of households agreed that EWI from different sources is coherent

Source - as reported in the PIR 2018

Access to CI / EWI has improved significantly over the project lifespan. Following the integration and dissemination of CI through NECOC, the OPM has been able to issue a monthly National Integrated EWS (NIEWS) bulletin since December 2016. The NIEWS bulletins are relayed through MoLG, down to district government. Via direct channels, UNMA also provides CI by e-mail to individuals, districts and organizations. MAAIF has taken responsibility direct the packaged bulletins and other CI such as seasonal forecasts / agri-advisories to district production officers for dissemination via the AEAS at ground level.

Local radio stations are obliged to provide public airtime which now more often includes a weekly CI broadcast, which allows more informed decision-making, however the monthly alert and advisory remains the most consistent information bulletin. Radio is the best tool to pass on CI due to its wide coverage among communities. For general awareness of access to CI tools, UNMA produced a series of newspaper articles.

**Sector-specific policies, budgets and development plans that integrate CI**

Baseline – zero; Target - three sectoral policies /investment plans / budgets, & ten district development plans

The UNMA Act 2012 was promulgated in 2014 and gave UNMA the mandate to monitor the climate and provide forecasts and advisories to government and stakeholders.

Five sectoral plans were reviewed for evidence of integrating CI / EWI into planning and budgeting (see also **Annex 5**):

- National Development Plan (NDP) II (2015-19) – p199 indicates the objective to ‘increase the functionality and usage of meteorological information systems’ via six interventions<sup>56</sup>. UNMA is mentioned as a retained project and again as a pipeline project.
- MWE Sector Development Plan (2015-19) – p55 - Under Weather & Climate (Meteorology), it has four strategies: Overhaul, automate and inter-link the meteorological network system; Strengthen

<sup>56</sup> i. Refurbish, modernize & develop meteorological stations; ii. Develop guidelines / regulations for operationalising the meteorological Act; iii. Develop policy, and strengthen the legal & institutional framework for meteorological services; iv. Develop and implement awareness programs on the importance and use of meteorological services; v. Design, develop and implement early warning systems (sector specific early warning products in support of climate change adaptation.); vi. Strengthen research on future climate trends and its impacts

observational & analytical capabilities of students and technical staff; Create awareness and promote use of meteorological services; and Strengthen the policy, legal and institutional framework for meteorological services. (see also Section 4.3 Environmental Risks to Sustainability for the MWE budgets for catchment-based management planning).

- UNMA Strategic Plan (2015-19) – Is to contribute to the achievement of the NDP II (2015-19) target on increasing automation of climate monitoring network from 20 to 40%
- National policy for disaster preparedness & management (2010) - The 2010 policy is now somewhat out of date e.g. 'Outline the structure, composition and functions of NECOC'. Its goal was to establish institutions and mechanisms that will reduce the vulnerability of people, livestock, plants and wildlife to disaster. It proposed to establish mechanisms for weather forecasting, EW and drought information dissemination and mapping and zoning of disaster-prone areas. It established the National Disaster Preparedness & Management Commission. The policy emphasized risk assessment, effective communication, EW, capacity development and planning, and gender integration
- The MAAIF Agricultural Sector Strategic Plan (2015-19) mentions improving resilience to climate change, but doesn't provide any specific guidance with regards to utilizing CI / EWI

The district development plans (DDPs) are considered under Output 2.3 (mainstreaming of CI), but in brief the finding was that climate change, and not yet the specific use of CI / EWI, is being mainstreamed, with budgetary evidence even weaker.

### 3.3.3 Achievement of Outputs

The presentation here is based on **Annex 2**. This section provides further text.

#### **Outcome 1 (Capacity of UNMA & DWRM to monitor and forecast CI) at the Output Level (4 Outputs)**

##### **Sixteen AWLSs installed; five rehabilitated; and 40 manual hydro-met stations installed (DWRM)**

See table for baselines, targets and results

Stations	Baseline	Target	Result
AWLSs	0	16	16 AWLS installed with 28 stations' housing constructed for telemetry*
Surface hydrometric stations	35	75	(75-35 = 40 is the target) 40 sets of spare parts were procured

Source PIR 2018

\* These figures have not been otherwise verified by the TE

The table indicates the results, however, the linkage of hydro data from DWRM to UNMA was not completed due to: a delay in construction of AWLSs; telemetry systems for data transfer were either removed or not installed). Thus, the hydrological data from DWRM is being generated / provided on an *ad hoc* basis, using the existing methods of manual download from the data loggers.

##### **Twenty-five AWSs & 32 manual WSs (12 synoptic, 10 agromet. 10 hydro-met.) installed and 32 AWSs rehabilitated (UNMA)**

See table for baselines, targets and results

Stations	Baseline	Target	Result
AWSs	6	36	20 Adcon + 5 TSAWS
Synoptic, agro /hydro-met. stations	12	44	i.e. to upgrade 32 (44-12) existing weather stations (12 synoptic, 10 agro-meteorological and 10 hydro-meteorological) with linkage to the NMC Automatic Messaging Switching System installed Upgraded 28 fences out of 32, Plus Buku station, Entebbe. Replaced Barometers, thermometers and sunshine cards, Upper air accessories 5. Improved security of weather equipment

Source PIR 2018

1. Originally 36 Davis AWSs were going to be rehabilitated, but the technology was superseded.

#### Operational status of Met. Stations

Station type	Existing	Operational	SCIEWS support
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Synoptic	12	12*	Yes, in all SCIEWS renovated stations
Agro-meteorological	17	17	Including 10 stations renovated under SCIEWS project
Hydro-meteorological	15	15	Including 10 stations renovated under SCIEWS project
Rainfall stations	150-300	60	Including 32 in the SCIEWS renovated stations
AWSs	33	33	Including 25 supplied via SCIEWS project
Radar	1	0	NA
Upper Air	0	1	Yes with support from SCIEWS project
Pilot Sounding	0	1	Yes, with support from SCIEWS project
Satellite receiving stations	1	1	NA

\*1-2 teething issues remain with a couple of AWSs off-line at the time of the TE. Source PMU Final Report

The 2015 Gap analysis consultancy on synoptic, agro/hydro-met stations and AWSs (inc. data rescue and rehab) informed the project on sites for new stations and the require specifications. SCIEWS installed 20 Adcon AWSs<sup>57</sup> and five 5 Earth Network TSAWSs. The Adcon systems are the main source of CD. The rehabilitation of 32 manual (12 synoptic, 10 agro-met, 10 hydro-met) was undertaken, but not the new establishment of 32 manual stations, as this wasn't considered to be useful. As part of the rehabilitation, equipment was replaced (barometers, thermometers, sunshine cards), and five sets of accessories for the air balloons procured. SCIEWs also improved the security of stations.

Importantly, an Automatic Message Switching System (AMSS) was established to automatically receive, check and forward met data and products by connecting with any standard communication device. This meant for example that the Adcon AWSs could provide timely CD to the NMC and internationally<sup>58</sup>.

#### **Climate forecasting upgraded including an integrated data management & information system and an online web platform for collaboration between DWRM and UNMA**

UNMA has established a modern met forecasting system by installing 12 synoptic stations across the country and a sever at the NMC at Entebbe airport. It has installed an AMSS to facilitate the telemetry and automatic data transfer via the cell net (Sim cards) under telecom contracts. It has improved cooperation with the regional weather hub in the Kenya Met Department in Nairobi (ICPAC).

CI from UNMA has been linked to NECOC in the OPM. UNMA and OPM on-line web platforms are working well. Data rescue and digitization from UNMA and DWRM archives nationally and in field is being achieved in-house with and with the support of OPM. Historical data aides the detection of climate change.

SCIEWS drafted an UNMA – DWRM protocol for data sharing (collection, exchange, processing, analysis) and extreme climate (flood, drought) risk assessment and warnings, although operationalization is pending data management from AWLSs. Data streams from the DWRM are not in place as installation of the AWLSs was only completed in June 2018.

#### **Capacity developed for maintaining observation networks and related infrastructure, developing an O&M toolbox, and establishing procedures between UNMA and DWRM**

The training (capacity building) target was for 9 met and 10 hydro trainers and 50 weather observers raising local community awareness. According to the training report provided (**Annex 5**) in the PMU Final Report, there was a total of 277 participants in training events<sup>59</sup>.

Under SCIEWS, UNMA has produced an AWS manual (2017) and an AWS O&M manual (2018). The PMU Final Report (June 2018, p21), indicates the extent of O&M for UNMA and DWRM systems and mentions that this was costed<sup>60</sup>.

As described elsewhere in this report, there were no additional procedures to manage the relationship

<sup>57</sup> Adcon has temp, rain, global radiation, rel. humidity, wind direction & speed, but doesn't include barometric pressure which is housed in the data receiving box.

<sup>58</sup> In March 2015, Solomon Mangeni, Senior Engineering Technician, UNMA provided an analysis of the IT Consultant and Peter Mutai's Reports on UNMA's IT need for modern infrastructure for data collection and transfer. This appears to be the point at which the project got moving.

<sup>59</sup> A participant could attend more than one event

<sup>60</sup> This was not verified by the TE

between UNMA and DWRM outside the PB – PTC – PMU set-up<sup>61</sup>.

**Outcome 2: (Efficient and effective use of hydro-met & environmental information for making early warnings and long-term development plans) at the Output Level (5 Outputs)**

**Capacity of UNMA and DWRM is strengthened for producing standard / customized climate forecasts and packaging hydro-met data / information for agencies and local communities<sup>62</sup>**

(Target - training 16 senior / junior forecasters)

See **Annex 5** for more details of training courses and events. In brief:

- UNMA Systems Engineer underwent training in India
- Supported 9 staff to participate in GHACOF<sup>63</sup> meetings 41 and 42
- Meteorologists / hydrologists benchmarking visit to Kenya Met Department
- Leaders benchmarking Visit to South Africa<sup>64</sup>
- Eight staff were trained to support hazard mapping in disaster prone Teso & Mt Elgon sub-regions
- Two sub-national workshops held

**CI tailored for severe weather & agricultural stresses, plus risk mapping in the Teso & Mt Elgon sub-region**

Target - (color-coded alerts – advisories and warnings for drought / flood, integrated cost-benefit analyses and sector-specific risk maps)

CI and EWS dissemination (and exchange) is administered by NECOC, and not directly under SCIEWS, but is part of a resulting output of SCIEWS. The EWI bulletins (called NIEWS) include EWs on flood / drought, agri-alerts and agri-advisories. The NECOC webpage includes hazard mapping (see example for Tororo given in this report).

The NECOC EWI is being tailored mainly for sub-regional (11 areas) broadcast and for DDMCs to act upon locally. Local radio stations now more routinely are able to provide a weekly CI / EWI broadcast enabling more informed local decision-making. MAAIF has also taken responsibility to work directly with district production departments (DPDs) to package CI from UNMA for dissemination to farmers. Thus, under SCIEWS, access to CI has improved significantly.

In 2018, UNMA trained local government staff on how to access and use CI directly from the UNMA website. Access to the Adcon telemetry climate data for each district, can be made via a live data link (not registered webpage yet, so need to direct IP address 196.0.33.173:80:80), although the data will come from the nearest Adcon AWS, not necessarily the district itself, but this is quite a useful tool.

See also section 3.2.2 – Institutional Mechanisms which provides an example risk map for Tororo District

**CI mainstreamed into national policies, workplans and local development planning**

Target – national policies<sup>65</sup>; and district development plans in priority districts in the Bukedi, Busoga, Elgon, Teso, Acholi, Karamoja and Lango sub-regions updated.

The PIR stated that the integration of CI into district development plans (DDPs) has been achieved for the 28 districts + 12 districts from the south-west.

The TE was able to confirm this to a certain extent through the assessment of 15 DDPs (DDPIIs 2015-20), which all mention awareness of climate change and mainstreaming of climate change actions across sectors and local programmes, however only a few describe mainstreaming weather, climate information and EW

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<sup>61</sup> To note, the UNMA – DWRM data-sharing output is the previous output.

<sup>62</sup> To note, the previous output (1.4) also concerns training, however whilst that output concerned CD technicians, this output (2.1) concerns CI analysts. The Final Report does not provide sufficient detail to clearly separate the two.

<sup>63</sup> Greater Horn of Africa Climate Outlook Forum (GHACOF), covering Burundi, Djibouti, Eritrea, Ethiopia, Kenya, Rwanda, Somalia, South Sudan, Sudan, Tanzania & Uganda, is coordinated by IGAD Climate Prediction and Application Centre (ICPAC) in Nairobi.

<sup>64</sup> A lesson learned – a need to retain skilled staff, and stop the ‘brain drain’ to regional met offices

<sup>65</sup> CI mainstreaming into national policies is recorded under the previous section 3.2.2



into planning and activities. This infers that SCIEWS was not effective in mainstreaming CI / EWI into local planning for this phase 2015-20, providing evidence that a Phase II or follow-up project is still required.

District plans assessed:

- Adjumani, Buikwe, Mayuge and Hoima DDPII - mention climate change as one of the cross-cutting issues. They call for mainstreaming climate issues into district programmes and projects.
- Mukono District mentions the need to deal with climate change but without a clear proposal on using CI.
- Serere DDP II- mentions strengthening of CI, awareness, dissemination and EW as one of the strategies to deal with challenges in the water sector. It also recognizes the availability of development partners to support the district on climate change as an opportunity
- Gulu DDP II - mentions dissemination of information as one of the strategies to combat climate change. Also explicit on integrating/mainstreaming climate change into district programmes
- Luuka district DDP recognizes climate change as a challenge. There is no specific mention on CI, only the provision of water for production.
- Masindi DDP recognises climate change as a cross cutting issue, with planning to mainstream climate change in all sectors
- Kasese DDP II recognizes climate change as a cross cutting issue, but has not mention of clear strategic interventions. However, Kasese district has a disaster management plan developed in 2017.
- Mbarara DDP II calls for the integration of NCCP including awareness creation in local government programmes. It recognizes climate change as a cross-cutting issues that needs to be mainstreamed in district programmes
- Ibanda DDP II - the district is already creating public awareness to local communities, strengthening coordination, and monitoring / reporting on climate change – to integrate and implement climate change adaptation & mitigation measures
- Mpigi DDP II - dissemination of climate change information, mainstreaming climate change as a cross-cutting issue, training communities on climate change
- Kibaale - recognizes climate change as a challenge. Kibaale has a budget allocation for the creation of climate change awareness
- Nebbi recognizes climate change as a cross-cutting issue that needs to be mainstreamed in district programmes.

**Communication procedures for alerts and advisories are strengthened at a national / local level including EWS dissemination (toolbox) and mobile alerts in Teso and Mt Elgon sub-regions**

OPM and its DDPM (with NECOC) has the mandate and responsibility for dissemination of CI and EWI to district level. UNMA is now the base provider of the CI. At district government level, two line-agencies are responsible:

- Via the MoLG, the CAO and its DDMC / Environment Office are responsible for EWI dissemination from central to parish level and for feedback from parish level.
- Via MAAIF, DAES is responsible for the DPD and AEAS for agri-advisory dissemination from central to parish level and for feedback from parish level. This includes seasonal and monthly forecasts, plus coordinated inputs from NECOC and NARO on agriculture disease and pestilence.

See also Section 3.2.2 Institutional Mechanisms, which describes in detail the operating mechanisms and their effectiveness.

**Sustainable Financing – government cost recovery arrangements, service level agreements and public-private partnerships (PPP)**

CAA is the main buyer of weather products from UNMA, partly as a result of the improved quality of CD / CI which is now certified to WMO ISO standards. Makerere University Centre for Research & Energy Conservation has bought some CD such as 15-minute interval wind and solar data from the synoptic stations.

Although UNMA has made various CD / CI publicly available, there is a market for CI services, with the private sector becoming more interested. SCIEWS held a PPP engagement workshop (June 2016, 60 participants) with a number of requests for UNMA services for the usage, generation, dissemination, and marketing of CI:

- Revenue from CAA is at US\$485,712 p.a. for services, and is expected to increase in line with improved service provision. The SCIEWS cost-benefit study informed UNMA's revenue negotiation for CI

provision to CAA

- On-going discussions with telecom companies to identify areas of partnership, for example to relay emergency alerts to mobile phones but also to disseminate CI.
- FIT Uganda (software company) who provide commodity prices. By adding UNMA CI, the value of the market information is improved, with UNMA receiving a share of the royalty payments. An PPP agreement has been signed
- A spin-off 'Hackathon' workshop for youth innovators to create CI applications<sup>66</sup>.
- Draft agreement with the Sugar Corporation
- Total Oil Exploration & Production (E&P) who procured an AWS in Hoima and share the CD with UNMA (although it is standalone). An agreement has been signed

### 3.3.4 Efficiency

#### Efficiency Rating – Moderately Satisfactory

Despite the issue of funds going to CIRDA and to Earth Networks, the project managed its funds well, including major contributions from UNMA and OPM in particular.

#### CIRDA

The UNDP-GEF project 'Climate Information for Resilient Development in Africa (CIRDA)' covers 11 counties<sup>67</sup>. From the GEF grant of US\$4m to SCIEWS, 10% (US\$400,000) was taken by CIRDA for regional coordination and dissemination activities. This was arranged by UNDP and GEF in New York, post SCIEWS prodoc approval<sup>68</sup>. CIRDA supported cross cutting studies such as those for PPP, technical support in technology transfer and regional south to south study visits. CIRDA also stepped in to 'balance' the number of TSAWS to be procured.

#### Earth Networks

Earth Networks (EN) produce Total Solutions Automatic Weather Stations (TSAWS) which are storm detection systems. They are fixed to mobile cell towers and cost US\$100,000 each to procure, with added costs for the data services and maintenance. SCIEWS bought five units from the GEF grant, with UNDP TRAC funds paying for their data services (CI) at US\$130,000 per year until 30<sup>th</sup> June 2018, with the data being utilised for short-term weather forecasting by the NMC. The data from the EN server in the USA is not available for UNMA generally to analyse, only for the NMC to receive on a short-term basis.

However, the TSEWSs do not conform to WMO ISO standards with the units located at an unrecognised height<sup>69</sup>. The reasons for the purchase of this system are unclear, although the MTR states that the PTC and PB were pressurised into making this decision.

With CIRDA and EN costing almost US\$1m out of the US\$4m GEF budget, it was necessary for the project to radically re-assess its equipment purchasing power and the impact on SCIEWS generally. The result was twofold in that: a more cost-effective ISO-standard AWS called Adcon was then identified and procured (US\$20,000 per unit); but the budget available for the dissemination of CI to local communities needed to be curtailed.

As of the end of the project (30<sup>th</sup> June 2018) and confirmed during the PTC meeting of 8<sup>th</sup> May and TE stakeholder workshop of 18<sup>th</sup> July 2018, UNMA has been asked to negotiate with EN a new 'much cheaper'

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<sup>66</sup> A mobile App prototype was developed as a result of this workshop, however a lack of open access 'interface protocols' have presented limitations to making the app work.

<sup>67</sup> CIRDA will enable vulnerable countries in Africa (Benin, Burkina Faso, Liberia, Sierra Leone, Sao Tome & Principe, Ethiopia, the Gambia, Uganda, Tanzania, Malawi and Zambia) to strengthen national CI systems as well as to benefit from regional coordination and draw upon a platform of knowledge management. <http://adaptation-undp.org/projects/programme-climate-information-resilient-development-africa-cirda>

<sup>68</sup> CIRDA stated that this was requested by the LDCF Council when it approved SCIEWS, however the TE was unable to verify this

<sup>69</sup> TSAWSs are located on cell towers at height on an arm perpendicular to the tower. They have a dust / particulate issue, which means they need to be cleaned, but can only be done so by taking the system back down to ground level which is expensive. The GoU is expected to pick up this cost.

contract for these CD services, however there is little political willpower to do so<sup>70</sup>.

### **Tahmo – a USAID-supported AWS**

Tahmo<sup>71</sup> is another satellite-based AWS, where the CD goes directly to the USA, and is not readily accessible to UNMA, added to which it is also not ISO compliant. Tahmo has installed 70 AWSs, but has no contract with UNMA. UNMA's legal team has been tasked to streamline an agreement.

### **Other efficiency issues**

- DDMC activities / training were originally at sub-county level, however the budget was cut as a result of the changes mentioned.
- The rehabilitation of AWS / AWLSs cost more than budgeted resulting in less stations becoming operational than planned for
- Due to DWRM administrative problems, they were requested to reduce their scope and budget

### **3.3.5 Relevance**

#### **Relevance Rating – Relevant**

The project design and implementation remained highly relevant to the extent that many of the outputs need to be continued and reinforced if the full value of the project is to be realised.

The project addressed needs specified in the National Development Plan I (2011-15), namely improved meteorological services including a total overhaul of met installations and the need to provide reliable weather forecasts. In addition, SCIEWS responded to the need for improved weather monitoring in order to provide EWI to aid disaster risk reduction efforts, as also described in the National Climate Change Policy (2015).

### **3.3.6 Country Ownership & Mainstreaming**

Country ownership is considered high with SCIEWS fully integrated into national planning and programmes. Mainstreaming is a specific project outcome indicator and output, thus it is also discussed in those relevant sections. The outcomes have contributed to long-term sectoral objectives for improved weather and climate monitoring for better planning and for disaster reduction and for long-term monitoring of water resources. MWE fully embraced the actions of SCIEWS in the respective subsectors.

The effort to mainstream weather and CI into national policies and plans has been underscored by the elevation of the Department of Meteorology to a semi-autonomous authority now known as UMNA. This is an indication of the commitment to continue to support the collection, processing and dissemination of CI.

Other initiatives such as NECOC in the OPM also demonstrate recognition in the value of generating and sharing EWI to reduce vulnerability and increase resilience to climate-related disasters.

## **4. SUSTAINABILITY**

**Sustainability:** According to the four GEF risk categories (financial, socio-economic, institutional & governance, and environmental), present status and the future

**Rating: Moderately Likely**

<sup>70</sup> EN TSAWS were considered by some / many to be expensive to buy, install, maintain and pay annually for their CD. - 'The TSAWSs procured for SCIEWS project support six existing storm sensors from the "Pilot Project on Severe Weather Now-casting Based on Lightning Detection in Lake Victoria Region." This brings the total number of TSAWS sensors in Uganda to eleven. In the long-term, the PPP with EN has delivered US\$0.5m in co-financing through the donation of assets, hardware and services by the company' <http://www.ug.undp.org/content/uganda/en/home/ourwork/sustainable-inclusive-economic-development/successstories/UgandapioneerslightningbasedEarlyWarningSystem.html> Thus, to the TE, it would appear that the SCIEWS purchase of these five units was a 'cost recovery' exercise by EN, with co-financing more in line with international / commercial CI services generally as opposed to SCIEWS directly. The article is considered by the TE as inaccurate.

<sup>71</sup> Trans-Africa Hydro Meteorological Observatory (TAHMO) through the Global Resilience Partnership. TAHMO is a regional initiative developing a network of weather stations in Africa, and use of data to provide climate information (tahmo.org). TAHMO provides weather data to mobile phone users who dial +12026004563. About US\$1m has been spent on installation of 70 AWS across the country.

**Justification:**

**The sustainability risks (financial, socio-economic and environmental) are rated as Moderately Likely**, i.e. the risks are moderate, with the expectation that at least some of the outcomes will be sustained.

**The sustainability risk for governance and institutions is rated as Likely**, i.e. there are negligible risks with this aspect of the project outcomes. This is due to the high level of support for UNMA and for NECOC from MWE, OPM and MoFPED.

The Atlas risk and the Risk log tables outline the risks (see section 3.1 project design). Some of the advances made by the project are not sustainable without further donor funds.

#### **4.1. Financial Risks to Sustainability**

UNMA is largely a public service that needs on-going funds for maintaining its weather equipment and for maintaining a capability for CD analysis and CI production. The state budget has increased significantly, which is supplemented by an annual request to development partners. Service payments from CAA go to the Treasury and not to UNMA.

Concerning DWRM, the MoFPED is said not to provide much funding to water resources management, however the MWE development plan, perhaps does not bear this out (See section on Environmental Risks).

In 2019/20, DWRM expect significant shortfall in budget in order to maintain all its new and upgraded stations provided by SCIEWS. DWRM admitted that this was partly its own fault in not submitting revised expected figures in time. Estimates are now likely only to be revised for the following financial year. The SCIEWS maintenance budget itself, for these stations was 'cut out' by agreement, thus DWRM have an on-going problem with not only a maintenance budget, but with criminal damage of some of their stations, (especially of solar panels), and a lack of funds for local awareness.

DWRM needs funds for a flood modelling & forecasting unit and for a calibration unit.

In terms of financial stability, the Modernization Plan for Uganda's Meteorological Services (MDA, 2013) probably provides the best starting point for assessing which aspects of the plan to take on board. It provides a very comprehensive financial analysis (p128-154) with a capital investment program to 2028. This should be assessed together with the UNMA Strategic Plan (2015/19) which has a short financial section (p51-55), but this only really covers the plan period and not really to Uganda's Vision 2040 period. This UNMA plan will need updating next year if not already, not least with MoFPED financing being on a three-year rolling system.

#### **4.2 Socio-economic Risks to Sustainability**

In the context of livelihoods, a promising start has been made, not least in updating the CI systems and the establishment of NECOC who are driving CI / EWI dissemination. SCIEWS wasn't designed to take the next step in 'improving livelihoods' and ensuring adaptation measures. This now obviously needs to come in via the new AEAS service and new projects.

#### **4.3. Institutional & Governance Risks to Sustainability**

##### **UNMA – Long-range forecasting**

Despite SCIEWS support, UNMA needs a further eight terabytes for storage + processing power to run in-country seasonal climate models (e.g. Climate Predictability Two, Systems Stat & Weather Forecast Model). The three meteorologists need to go in turn to the ICPAC centre in Nairobi to do this at present, which means they are arriving 'cold' with valuable time taken up.

There are issues concerning not just the cost of equipment maintenance (especially in 3-4 years' time for parts replacement), but also of trained capacity to do so, especially for the Adcon / synoptic units. With the event of this new generation of AWSs, the keeping of older systems (e.g. Campbell, Davis) and manual instruments needs to be assessed, especially at synoptic stations where calibration is useful. In other cases, cost-benefit may be too low.

A challenge however for UNMA is the relatively low number of personnel (currently at 70% capacity) to provide the linkage with sub-national partners. The role of UNMA in CI dissemination below district level also needs clarity. For example, should UNMA have a training section to deliver short courses at regional level and for projects as a service. Farmer awareness in accessing and utilising CI effectively remains an issue, especially as the climate has changed.

The role of UNMA to sell its services to the commercial agri-product sector (e.g. sugar) needs boosting which involves for example capacity building of trained meteorologists<sup>72</sup>.

As part of efforts to decentralise met services, UNMA has officers proposed and budgeted for the four regional zones (Eastern, Northern, Western / SW, and Central), although they are not yet deployed. This devolvement plan is expected to begin by the end of 2018, although the extent of regional services that can be provided is not clear. The UNMA strategic plan indicates a need for 250 stations to cover a country of 248,000km<sup>2</sup>, which seems excessive.

## **DWRM**

DWRM's capacity issues (Final Report, p21) have been noted: 'Routine O&M of the hydrological stations due to: vandalism; ignorance on the importance of the equipment; breakdown of sensors; inadequate staff maintenance fees; limited budget; limited capacity of staff to cope with the changing technologies; inadequate staff structure at central and zonal level; inadequate equipment (e.g. flow measurement) at the zonal level.

The DWRM will close at Entebbe and be re-designed into a Water Resources Institute. DWRM will relocate to Luzira in Kampala.

The exit strategy (Aug 2017, Minutes of O&M and Exit Strategy) for DWRM states the sustainability issues for the three sets of equipment that SCIEWS procured:

- 16 AWLSs - need spare parts, solve transmission issues, add internet connection, improved security
- Rehabilitation of 40 manual hydro-met stations + 5 AWLSs - Upgrade to telemetry

## **UNMA's NMC - Short-range forecasting**

Five years ago, UNMA was using a manual plotting system with satellite information, however the new systems have issues. The Synergy system which shows all the required weather parameters on one system for short-term forecasts (based on worldwide synoptic weather stations' data) was out of operation for one month in July 2018<sup>73</sup>. The TSAWS storm detectors (not just lightning) are functioning, but CD is not accessed or used directly by the NMC. There are five around Lake Victoria, with SCIEWS adding five more. The Windshear system for rolling low level weather is installed but not yet connected. UNMA has one radar (thunderstorms, clouds, 200km range) but is not operational. It is in the process of procuring two more units, however they are expensive.

## **4.3. Environmental Risks to Sustainability**

DWRM are in the process of establishing a 'water resources modelling & forecasting unit', with a pilot consultancy to provide a flood prediction model and capacity, costs and equipment needs<sup>74</sup>. The modelling which is being supported by Danida is going to set thresholds / red flag levels for flood warning, beginning in the Manafwa catchment and in the Mt. Elgon region. DWRM have 6-10 modellers / engineers with some computers to manipulate raw data, thus a capacity issue remains. At present one DWRM analyst issues

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<sup>72</sup> E.g. a tea plantation may get good rains, but has low productivity. Why? One commercial farm in Kenya spent one year to find that the problem was due to low sunlight. (pers comm. M. Waiswa)

<sup>73</sup> The reason for the breakdown was unknown, but possibly due to a cabling issue or the licensing subscription not being paid. NMC also reported a very slow and intermittent internet speed, due to an old contract with a now defunct telecoms company. This was worrying given that the TE noticed that fibre-optic cables were present 100m away, if not directly to the NMC. With the CAA service contract, this lack of functionality was disappointing.

<sup>74</sup> The data from this modelling unit, from the AWLS stations once they have telemetry, and the catchment / flood maps of DWRM are all significant base data sources for NECOC. DWRM should ensure that it budgets for the training of four scientists two of which should be seconded to NECOC, with their state contracts / pensions remaining with DWRM - again to avoid any 'brain drain'.

internal daily alerts (e.g. for Lake Victoria) to higher management and to monitor trends especially the flood-prone rivers.

Catchment planning under DWRM needs to be enacted and integrated. MWE Water and Environment Sector Development Plan 2015/16 - 2019/20 Key priority 1 includes 'promote catchment based integrated water resources management'. The MWE plan indicates UGX62.75b (for the same period) for integrated catchment-based water resources management (at the zonal level)<sup>75</sup> and a similar slightly smaller figure for water permitting.

Under DWRM, there is UGX16m for developing & implementing 20 catchment-based management plans in four water management zones (p110). Deconcentrated structures have been established in four water management zones of Victoria, Kyoga, Albert & Upper Nile.

Under DWRM, there is also UGX 33.3m for development & operationalizing a flood management framework for Kasese, Awoja and Manafwa catchments. A flood management strategy for selected catchments is to be scaled up.

## 5. IMPACT & CATALYTIC EFFECT

**Impact:** According to the three GEF categories (Significant, Minimal or Negligible), present status and towards the future

**Rating: Significant**

**Justification:** SCIEWS / UNMA has gone some way towards meeting the NAPA objectives including strengthening met services and expanding weather observation network. UNMA is at the stage of a major upgrading of CD systems installation and improving CI modelling / analytical requirements. The beneficiaries of CI such as MAAIF and NECOC are at an early stage in the further packaging and dissemination of CI / EWI, thus much remains to be achieved. SCIEWS has significantly raised climate information on the political agenda, and in understanding that such information is required, as a starting point for integrated climate planning at all levels, including catchment and EWSs. SCIEWS has demonstrated the need for further enhanced state and donor inputs.

### 5.1. Impact

The impacts are clear in terms of: updated national CI / EWI, improved East African regional forecasting capability; and national and international aviation safety especially at Entebbe Airport. CI for aviation is now ISO compliant under WMO standards.

Prior to SCIEWS, Uganda's CI provision was the weakest in East Africa, now it is mid-range. Climatic data (CD) is now automatically in digital format as it is transmitted via telemetry. This means that the value of the CD is much higher and can be utilized much more broadly by a much wider array of state and non-state actors. Manual data is being scaled-out, and may just be maintained at specific locations for calibration purposes.

The IPCC for its 3<sup>rd</sup> Annual Communications of CI and global warming prediction used secondary source data, but for the next round it should be able to use primary data generated by UNMA.

Strategic policy changes have been described, in particular the preparation of the UNMA Strategic Plan. This is the first such plan for UNMA with the enthusiasm to produce it high for a new agency. SCIEWS bolstered this, but the true impact here will be the financing and implementing of it. Having made the first plan, it will be important to produce the next one (2020/21 - 2024/5), thus conveying again to government the longer-term planning and financing.

As a result of SCIEWS, three new projects are being prepared: Under GCF, the concept note for a new UNMA CI project has been prepared, with full proposal design about to begin. It is expected to include CI packaging and dissemination, utilization of hydro-met information, and PPP services; OPM is preparing a community resilience project; and UNDP MAAIF project is being designed to increase the access to CI. Also, best practices

<sup>75</sup> Cost matrix annex, p82 - integrate catchment management plans and implement identified climate change (CC) adaptation measures; establish a Water Resource Institute for in-country human resource capacity development for water resources management and develop and review legal and institutional framework for WRM

from SCIEWS contributed to the success of the hydromet component of GCF Resilient Communities & Wetland Restoration Project implemented by MWE.

Measuring impact requires assessing the pathway from project outcomes to expected impacts<sup>76</sup>. The expected impacts were to provide CI to reduce the negative effects of climate change and degradation of the environment:

#### National Adaptation Programme of Action (NAPA) on Climate Change under UNFCCC

The NAPA priorities were:

- #3 - Strengthening meteorological services, including expanding weather observation infrastructure (networks) and promoting a multimedia approach to weather and CI dissemination<sup>77</sup>
- #9 - Climate change development & planning project, including reviewing policies and laws in relation to climate change and sensitizing and training decision-makers, planners and implementers to the impacts of climate change<sup>78</sup>

It is clear that SCIEWS has gone some way towards meeting these priorities. The provision of CI / EWI has increased considerably since the beginning of SCIEWS, however this can be put in the context of measuring impact with 7-8 stages of application still required. In brief these are listed:

1. UNMA is at the stage of a major upgrading of CD systems installation and improving CI modelling / analytical requirements
2. The standardization and operationalization of equipment is still required
3. The planning and financing of UNMA's mainly public services remains on a short-term footing and is not necessarily matched to an agreed level of modernization
4. Data-sharing of CI is required, as is agreement on the dissemination routes of CI / EWI
5. Beneficiaries of CI such as MAAIF and NECOC are at an early stage in the dissemination of CI / EWI
6. EWS, hazard mapping and catchment planning are not linked
7. Local level institutionalization of CI / EWSs has just begun and needs strengthening
8. Use of CI for climate change adaptation at a farm level has yet to be linked or applied

#### Improvement in ecological status / reduction in stress on ecological systems

The positive environmental impact has yet to be seen, but the building blocks are being put in place, such as the allied catchment planning under the DWRM mandate. The link to MAAIF (including AEAS and NARO) in terms of realizing adaptation measures remains weak, but this is a post-SCIEWS project objective.

The impact of the project to reduce environmental degradation has high value, but at present the systems are either not fully operational or integrated. The future may involve MWE taking the lead in facilitating climate and water services to be better applied from national to local level. There are many facets of this, but two stand out: The role of MAAIF and their link to UNMA meteorologists needs strengthening; and at present, UNMA and NECOC are taking on the role of preparing and disseminating agri-advisories. Thus, the actual involvement of MAAIF is unclear, but probably needs to be strengthened via a Climate Information and Adaptation Unit for example. MAAIF was to be the major beneficiary under SCIEWS, but has been largely more passive than active.

## **5.2. Catalytic Effect**

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<sup>76</sup> GEF Evaluation Office 'Review of Outcomes to Impacts' Handbook 2009 - includes 3 stages: 1. Identifying the project's intended impacts; 2. Verifying project logic; & 3. Analyzing project's outcomes-impacts pathways (i.e. is the Theory of Change realistic, in the process of being delivered / likely to be achieved) – in order to provide an indirect method of assessing expected impact.

<sup>77</sup> Priority activities included: i) data collection and technical capacities; ii) availability, accuracy and timeliness of CI; and iii) application of CI by vulnerable communities and economic sectors.

<sup>78</sup> The NAPA identified the need to: i) expand and maintain weather / climate observation networks; ii) strengthen data collection, processing, analysis and interpretation; iii) strengthen human capacity in weather observing, forecasting & information management; iv) scale up information management & communication systems; v) strengthen EWSs & coordinating mechanisms; vi) package CI for vulnerable communities; vii) sensitize communities on CI use; viii) disseminate & promote use of CI; ix) develop partnerships and synergies with media & other stakeholders; and x) monitor & evaluate utilization of CI.

## Scaling-up

SCIEWS was designed to upgrade and scale-up the automation of weather observations and transmissions. It was deemed more effective for SCIEWS to be implemented country-wide from the beginning. However, it largely lost its CI uptake and dissemination awareness aspects, which could have continued on a pilot basis in the Mt Elgon and Teso sub-regions in the 28 districts, if it were not for the altered aspects of the project (see section on Efficiency).

## Replication (outside of the project)

Replication is occurring. Two examples are:

- Program for Restoration of Livelihoods in Northern Region (PRELNOR/IFAD) - partnering on infrastructure development of weather observation systems in Acholi sub-region, including dissemination
- MWE/DWRM is receiving funding from the Adaptation Fund of US\$7.75m for the project 'Enhancing of communities to climate change through catchment-based integrated management of water resources (EURECCCA)'. It is being implemented from 2017-21 in Maziba, Aswa and Awoja catchments.

## Demonstration

As a demonstration of identifying suitable equipment, SCIEWS has been effective. As a demonstration of ensuring local access to CI, SCIEWS with the exceptional support from NECOC, was able to provide regular bulletins. However, the percentage of the population, especially farmers receiving such information, was considered low<sup>79</sup>.

## Production of a new technologies /approaches

SCIEWS has tried and tested new technologies which involved installing new equipment with new O&M requirements. SCIEWS has also involved: climate data generation (automatic transmission), management and analysis; collaborative institutional mechanisms (UNMA working with NECOC, DWRM and MAAIF); and the creation of PPPs.

# 6. CONCLUSIONS AND RECOMMENDATIONS

## 6.1 Conclusions

UNMA's modernisation under SCIEWS has been successful. SCIEWS has highlighted the future minimum required status for CI and EWSs provision, and has successfully been testing the systems for the last 18 months. The capability in forecasting and its reliability has significantly improved (due to equipment upgrade and practice in forecasting)<sup>80</sup>. Twenty new AWSs are transmitting data to UNMA. Twelve synoptic stations are operational. These are ISO accredited to WMO standards and are contributing to East Africa / international weather forecasting.

UNMA's CD gathering network was not significantly expanded, but AWSs were placed where needed and automated under SCIEWS, which was one of the main aims. An automatic message switching system (AMSS) was installed to share synoptic CD globally in real time. Before SCIEWS, the data from only one station was transmitted manually on a global level, with no data returned. Now ten (out of 12) AWSs transmit automatically under the global AMSS with all global data returned as required.

Based on their 6-monthly portfolio review, MoFPED considered SCIEWS as a flagship or benchmark project in terms of delivery. UNMA as the lead implement partner has moved to meet stakeholder expectations, however the challenge remains for planning and financial commitment from government. O&M costs are and on-going issue (including re-calibration, spares / batteries & periodic maintenance).

Revision of the budget to include five EN TSAWSs (located on cell tower masts) was at considerable cost and negatively impacted on the project coverage of climate infrastructure and EW dissemination capacity. The

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<sup>79</sup> This is based on the TE field mission talking to local government and farmers in a number of districts. The project figures regarding the population receiving CI via radio for example could not be verified.

<sup>80</sup> Weather predictions are becoming much more accurate. E.g. March – May (MAM) 2018 forecast correctly predicted rainfall pattern that would cause floods.



revision of budget to include the regional CIRDA overseeing project (across 11 countries) also negatively impacted on ability to deliver CI awareness and services to farmer level (Component 2). These two alterations cost ~US\$1m, which was primarily out of the US\$4m GEF fund and is considered highly significant. The positive capacity building and training aspects of CIRDA are presented in **Annex 5**.

A number of project reports refer to 'the last mile' which relates to both the operationalization of weather and forecasting systems, and the delivery and application of CI / EWI, especially at local levels.

The primary source of climate data (CD) and climate information (CI) is UNMA. It is then repackaged by NECOC and MAAIF. Districts use consolidated NECOC bulletins for EW and disaster risk management. Districts also use email and SMS 6700 to receive and report to OPM / NECOC on imminent threats. The confidence in CI / EWS services has been strengthened under SCIEWS. However, for CI dissemination from district to sub-county to parish to farmer, there is a variable picture, with insufficient evidence to show significantly improved access to CI at the local level. There are a number of CI / EWI transfer methods to and from the district governments which are developing (email, WhatsApp, MAAIF/AEAS direct to farmer groups, radio bulletins / talk shows).

UNMA's sub-regional CI forecasts cover ~8 districts each. However, the CD is more accurate with AWSs now having a 29% coverage, thus there is an opportunity to tailor-make forecasts down to a more local (district) level, if sufficient computer processing power and analysts were available. This step-up would be considerable and should be piloted first.

At present the exact internet protocol address (196.0.33.173:8080) to access Adcon telemetry data is hardly known, although summary CD is being generated to a district level (with the CD based on the nearest AWS, not necessarily the actual district). The website also provides district-level monthly rainfall over the last 2.5 years, which allows interested parties such as local AEAS offices to compare climate patterns themselves<sup>81</sup>. It was noted that the NARO stations (e.g. Lira) are not fully utilising Adcon data. This needs to be addressed as they pilot new varieties of crops with differing drought-tolerance for example.

The lack of an up to date telecoms agreement for the NMC is concern. The lack of bandwidth and uninterrupted connectivity means that key systems for short-term weather forecasting (for use by aviation at Entebbe and across Uganda) are not fully operational.

DWRM was very late in installing the AWLSs and is not yet transmitting data. This is due to the telemetry units not being installed, because of a known high risk of theft and vandalism. Added to this, DWRM missed the 2018 government planning window which should have included the request for an O&M budget for these new SCIEWS stations. Thus, in spite of the efforts of SCIEWS, Uganda remains without an effective flood warning system.

DWRM partnerships with water-based projects is weak (Final Report, p20). This is especially the case in the state / commercial power sector (Jinja power scheme; Rippon Falls), where extra and specific modelling costs should be recompensed directly to DWRM.

Catchment-based water resource management planning is at an early stage and not linked to NECOC district hazard vulnerability mapping, nor available CD / CI. This needs facilitation.

The success of SCIEWS, contributed to the GCF Wetlands project design and approval and has garnered interest from GCF for a follow-up SCIEWS project proposal for enhancing climate services. SCIEWS has demonstrated the need for a phase II project.

## 6.2. Recommendations

The recommendations are listed with the responsible party identified in brackets.

1. The next UNMA strategic plan needs to be prepared with inclusion of a longer-term forecast on state budgetary needs for a set minimum level of required public services [UNMA]
2. UNMA to assess their ability to provide tailored CI on a district-basis, to be piloted in areas which are

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<sup>81</sup> For accurate analysis, further detail is needed as monthly averages don't show the changing rainfall patterns such as high intensity periods with longer dry periods. The provision of this level of CD detail needs added agreement with UNMA.

- disaster prone or of strategic agriculture importance for example. This could be piloted under another project and provide an opportunity to train further meteorology analysts [UNMA]
3. The NMC needs to become fully operational, with a new telecoms agreement for unlimited high-speed fibre-optic data transmission and its systems for short-range weather forecasting for aviation debugged. [UCC / UNMA]
  4. The development of a new GCF-funded project should be expedited, with the inclusion of piloting dissemination of CI to farmer level<sup>82</sup> [UNMA with DAES]
  5. An EWS for flood response is needed. A management decision is required on the level of security and local awareness needed for key AWLSs to be automated with telemetry [MWE]. A DWRM flood forecasting & modelling unit feasibility needs expediting [DWRM]
  6. Catchment-based water resources planning is needed to mitigate flooding. The technical capacity of DWRM and its zonal offices needs to be strengthened. Catchment-based plans are part of the MWE plan, however a donor project also should be sought to strengthen this. [MWE / MoFPED funding]
  7. The main axes of agri-climate information analysis and transfer need to be assessed and strengthened, so that CI is better utilized [MAAIF / DAES]

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<sup>82</sup> UNMA's mandate to deliver CI stops at district level

## 7. ANNEXES

### Annex 1: Delivery of Project Objective and Outcomes against Performance Indicators

**Assessment Key:**

**Green:** Completed / Achieved

**Yellow:** On target to be completed / achieved

**Red:** Not on target to be completed / achieved

Extracted from project document			IP to fill out this column with detail text on achievement	TE team	TE team
Indicator	Baseline	End of Project target	2018 End term Level & Assessment	Achievement Rating	Justification for Rating
<b>Objective: To strengthen the weather, climate and hydrological monitoring capabilities, EWSs and available information for responding to extreme weather and planning adaptation to climate change</b>					
1. Capacity as per capacity assessment scorecard (see Annex 7 in the project document).	Average capacity scorecard rating of 77 across men and women (Prodoc, Annex 7)	CCA capacity scorecard rating is increased to an average of 143 for both men and women (Prodoc, Annex 7)	The project has attained measurable outcome level results by project closure. As per the Capacity Scorecard, overall cumulative programmatic rating is 99% for both men and women: Capacity of Agencies to produce early warning information has increased from 92% in 2017 to 99% in 2018 (50.5 out of target 51) attributed to quality assurance to installed weather stations and the bench-marking exposure visits to the South Africa Weather Services and various in-house training The capacity to package information increased from 89% in 2017 to 92% (35 out of target of 36) due to in house training of UNMA and DWRM staff by suppliers of weather equipment, and Quality Management Expert from the Kenya Meteorological Department; Capacity to disseminate information has remained at 100% (target of 36 out of 36) for UNMA, This did not change for the DWRM as installation of the hydrological stations were completed a month to end of the project; Capacity of legislative and governance has slightly increased from 81% in 2017 to 85% in 2018 (15 out of 16), because of increasing inclusion of budget for early warning in the District Development Plans particularly in the 28 pilot project Districts	S	S – CD is being collected to international standards. It is being analysed and packaged into monthly and seasonal forecasts on a sub-regional scale. EWI is being delivered to district level
2. Domestic finance committed to UNMA, DWRM and other	Annual budget of US\$1,500,000 and \$ 450,000 allocated to UNMA and DWRM	>20% increase in domestic financing committed to UNMA, DWRM and other	Domestic finance committed to monitor extreme weather and climate change/provide climate information EW services has cumulatively reached US\$ 22.9 million. UNMA - US\$ 9.0m has been allocated for Financial Year 2018/19 as compared to US\$ 8.4m in 2017/18; US\$ 6.2m in 2016/17; US\$ 2.5m in 2014/15) representing between 50 to 100% increase every year. In addition, revenue generated from CAA and other clients has increased from US\$485,712 to US\$500,000 p. a. This is expected to increase further as more revenue is		S – As a new agency, UNMA has had a significant boost in funding since 2014/15.

relevant institutions to monitor extreme weather and climate change.	respectively to monitor extreme weather and climate change.	relevant institutions to monitor extreme weather & climate change (inc. equipment O&M)	realized from avenues recommended in various studies including in operation and maintenance strategy and plan for the hydro-met infrastructure as part of the project exit strategy.		DWRM funding is not clear, but is considered to be insufficient with major restructure changes to DWRM underway
<b>Outcome 1: Enhanced capacity of UNMA &amp; DWRM to monitor and forecast extreme weather, hydrology and climate change</b>					
1.1: % of national coverage of climate/weather and hydrological infrastructure.	UNMA 10% coverage of operational manual (9%) and automatic (1%) weather (synoptic, agro/hydro-met.) stations	UNMA 47% coverage of manual (26%) and automatic (33%) weather (synoptic, agro/hydro-met) stations	In terms of national coverage, the project has contributed 63% of AWSs in the country, and GIZ/USAID 37%, and over 40% of weather information is being disseminated from the EW project installations. The status of national coverage for rain gauges has remained at 46% with 52 out of the 112 districts	<b>S</b>	<b>S</b> – Coverage is good. Any improvements should emphasize representation of Uganda’s climate zones rather than district coverage
	DWRM– 28% national coverage of operational surface hydro-met stations (24%) and AWLSs (4%)	DWRM – 50% coverage of operational surface hydrometric stations (50%) and AWLSs (19%)	~50% coverage based on the number of AWLS installed		<b>MS</b> – The issue is a lack of automation
	AWSSs: 6	AWSSs: 36	20 AWSSs and 5 TSEWS procured and installed against target of 30.		<b>S</b> – The AWSSs are working well
	Manual synoptic, agro/hydro-met stations: 12	Manual synoptic, agro/hydro-	i.e. to upgrade 32 (44-12) existing manual (12 synoptic, 10 agro-meteorological and 10 hydro-meteorological) and 32 AWSSs in priority areas. 12 out of 12 (100%) of the synoptic stations are functional and are providing near real-time weather information		<b>HS</b> – The establishment of synoptic stations to WMO ISO

		met stations: 44	Upgraded 28 fences out of 32, Plus Buku station in Entebbe. AMSS procured, installed and operational with linkage to the NMC Replaced Barometers, Replaced Thermometers and sunshine cards, Procured upper air accessories 5. Improved security of weather equipment Twenty-five (25) districts received AWSs that have digital rain gauges, installed. In total 27 base weather stations were renovated and 25 were installed.		standards is an achievement. The AMSS was a benchmark
	Surface hydromet stations: 35 AWLSs: 0	Surface hydromet stations: 75 AWLSs: 16	28 stations constructed for telemetry, but automatic transmission is not yet working 16 AWLS have been installed with manual data logging. DWRM manually download data on a monthly or ad hoc basis		<b>MS</b> – the 16 AWLS remain manual. Telemetry is not being used due to theft
1.2: Frequency & timeliness of climate data (CD)	UNMA – >Hourly for synoptic stations;  >Once a month for agro- and hydro-met stations	UNMA – Hourly for synoptic stations;  Decadal (every 10-days) for agro- & hydro-met stations	12 synoptic stations are transmitting every 15 minutes according to WMO ISO standards Agro-met stations are functional and are giving reliable information for monthly and decadal forecasting Manual equipment has been used to calibrate new automatic equipment		<b>S</b> – This is the transmission of CD from the stations. 12 synoptic stations are transmitting data every 15 minutes (2 of these stations had minor issues during the TE)
CI	Seasonal forecasts have a lead-time of 0-2 weeks	Seasonal forecasts have a lead-time of 2 weeks	Seasonal forecasts now have a lead in time of 2 weeks		<b>S</b> – This is the analysis of CI to produce weather forecasts and other packaged CI.
	Monthly weather reviews	Once a month weather review	Monthly weather forecasts are produced by UNMA and issued by NECOC		<b>S</b> – The UNMA monthly forecast is also packaged

	/ forecasts are not issued	and forecasts is issued			by NECOC for their monthly bulletin
	Agro-met monthly advisories are not issued	Once a month an agro-met advisory is issued	Monthly and 10-day weather forecasts (CI) are being produced		<b>S</b> – The UNMA monthly forecast is also packaged by NECOC for their monthly bulletin. MAAIF involvement is limited
	DWRM – weekly to monthly	DWRM – 6 hourly; and 2-4 hourly for flood prone sub-regions	Advisories from the DWRM are being generated on case by case basis, using the existing systems		<b>MU</b> – The ability of DWRM to utilise its water level and water flow information for the purposes of flood warning is limited to the manual extraction of data on-site
<b>Outcome 2: Effective use of hydro-met and environmental information for making EWs and long-term development plans.</b>					
2.1. % of population with access to improved climate information and drought, flood and severe storm warnings (disaggregated by gender).	3% of men and 3% women with access to improved climate information and flood, drought and severe weather warnings (to be confirmed during	12% of men and 12% women with access to improved climate information and flood, drought and severe weather warnings.	<p>A monthly weather review and forecast is issued and disseminated through various avenues. UNMA is providing CI to districts &amp; organizations that need CI. The monthly NIEWS bulletin issued by NECOC is most prominent. Following integration of CI in NECOC, the OPM is now able to issue the NIEWS bulletin since December 2016.</p> <p>Through the MoLG, weather information is being delivered to local government &amp; communities. MAAIF has taken some responsibility to work with district production officers to package CI from UNMA for dissemination to farmers. A series of publications were made in the two main print media to explain about CI</p> <p>Access to CI has improved significantly. 72.2% of households received EWI from radio; Most reliable Sources of CI was: radio (51.4%); television (4.2%) and no information (48%)</p> <p>Frequency of Updates: 36.8% receive updates seasonally;14.4% receive monthly updates</p>	<b>MS</b>	<b>MS</b> – This is difficult to gauge without a survey, however anecdotally, TE would say that only ~10% of farmers are accessing climate information – mainly via local

	project inception). Male: 920,000 Female: 1,010,000	Male: 3,300,000 Female: 3,700,000	In terms of timeliness of EWI: 75.2% of households reported that EW was timely; 58.7% of households facing temperature disasters reported timely EW information; 91% of households agreed that EW information from different sources is coherent; 74.1% of households reported seasonal EW forecasts.		radio bulletins (weekly) and programmes (monthly, and seasonal forecast)
2.2: Sector-specific policies, annual budgets and development plans that integrate climate information	0	<b>Three</b> sector specific policies and investment plans / budgets and: <b>10</b> district development plans	The PIR does not mention sector policies and the integration of CI.		<b>MU</b> – National policies and District Development Plans are only just beginning to move from mentioning climate change to actually using climate information for adaptation

## Annex 2: Delivery of Outputs

Comment here may be limited to stating 'on target', 'partially on target' or 'not on target'. Details are reported under section 3 'Findings'

Outputs	Achievements Reported by IP	TE Comment
<b>Project Objective: To strengthen the weather, climate and hydrological monitoring capabilities, early warning systems and available information for responding to extreme weather and planning adaptation to climate change in Uganda</b>		
<b>Outcome 1: Enhanced capacity of the UNMA (formerly DoM) and DWRM to monitor and forecast extreme weather, hydrology and climate change</b>		
1.1: 16 AWLSs and 40 manual hydro-meteorology stations installed and 5 AWLSs rehabilitated in the Victoria, Kyoga, Albert and Upper Nile Water Management Zones (WMZs.)	<ul style="list-style-type: none"> <li>▪ 16 AWLSs (with telemetry) installed (2 stations were retracted due to threats of vandalism)</li> <li>▪ 28 manual hydro stations (infrastructure - telemetry houses) constructed</li> <li>▪ 40 sets of spare parts</li> <li>▪ Linkage of hydro data from DWRM to UNMA not completed due to delay in construction of AWLSs</li> </ul>	<ul style="list-style-type: none"> <li>▪ On-target</li> <li>▪ Consultancy on the requirements was not completed</li> <li>▪ Plan to integrate hydro stations data into the UNMA network was not achieved, pending quality control of AWLSs</li> </ul>
1.2: 25 AWS installed and 32 manual (12 synoptic, 10 agro-met and 10 hydro-met) and 32 AWSs rehabilitated in priority districts.	<ul style="list-style-type: none"> <li>▪ Gap analysis of synoptic, agro/hydro-met stations and AWSs (inc. data rescue and rehab) - consultancy (2016) informed sites for new stations and specifications</li> <li>▪ Installed 20 Adcon AWS + 5 Earth Network TSAWSs (Adcon systems - Main source of CD)</li> <li>▪ Rehabilitation of 32 manual (12 synoptic, 10 agro-met, 10 hydro-met) and 32 AWSs</li> <li>▪ AMSS procured and installed</li> <li>▪ Equipment replaced (barometers, thermometers and sunshine cards); procured upper air accessories 5</li> <li>▪ Improved security of stations, linkage with the NMC and timely weather forecast</li> <li>▪ Integrate AWSs into the existing UNMA network with appropriate telecommunication infrastructure – done, bar DWRM link</li> </ul>	<ul style="list-style-type: none"> <li>▪ On-target</li> <li>▪ Linking the synoptic stations via an AMSS was an important step in allowing Ugandan weather information to become part of WMO standard international weather information</li> </ul>
1.3: Weather & climate forecasting facilities upgraded including an integrated hydro-met data management and information system and an online web platform for	<ul style="list-style-type: none"> <li>▪ Established a modern met forecasting system to support the 12 synoptic stations and the NMC at Entebbe - Procured the AMSS, and equipment (servers, solar panels, hard/software, telecom contracts for telemetry); Improved linkage to the regional weather hub in the Kenya Met Department in Nairobi (ICPAC).</li> </ul>	<ul style="list-style-type: none"> <li>▪ On-target</li> <li>▪ The system was significantly improved</li> </ul>



operationalizing collaboration arrangements and procedures between DWRM and UNMA.	<ul style="list-style-type: none"> <li>▪ Protocol / agreement between DWRM and UNMA for data sharing (collection, exchange, processing, analysis) and extreme climate (flood, drought) risk assessment and warnings - consultancy completed with UNMA / DWRM MoU signed, but operationalization pending data management from AWLSs</li> <li>▪ UNMA and NECOC web platforms are working. CI from UNMA has been linked to NECOC in the OPM.</li> <li>▪ Creation of DWRM hydrological modelling centre is pending</li> <li>▪ Data streams from the DWRM is not yet in place as installation of the AWLSs was completed in June 2018 when the project was closing.</li> <li>▪ Data rescue and digitization from UNMA and DWRM archives nationally and in field – achieved in-house with support of OPM; DWRM data stream not ready</li> </ul>	<ul style="list-style-type: none"> <li>▪ UNMA and DWRM had not signed a protocol.</li> <li>▪ DWRM was not automatically transmitting data</li> </ul>
1.4: Capacity developed for maintaining observation networks and related infrastructure including training 9 met and 10 hydro trainers and 50 weather observers, raising local community awareness, developing an O&M toolbox, and establishing internal arrangements and procedures between UNMA and DWRM	<ul style="list-style-type: none"> <li>▪ Various capacity building was carried out (See <b>Annex 5</b> – Training) for technicians to install and manage climate infrastructure</li> <li>▪ A challenge is the relatively low number of UNMA personnel (currently at 70% capacity) to provide the linkage with sub-national partners. UNMA is addressing this issue by signing MoU with local governments</li> <li>▪ During the 2018 sub national workshop, the UNMA technical team were able to train local government staff on how to access the weather information from the UNMA website and further trained on how to interpret the CI.</li> <li>▪ To address the challenge of limited capacity at the lower local government levels, the MoLG has been working very closely with UNMA to engage sub-national technical teams to reach out to the communities</li> </ul>	<ul style="list-style-type: none"> <li>▪ Partially on target</li> <li>▪ Final report doesn't include this output</li> <li>▪ Other than the establishment of the project board and technical committee roles, there were no formal internal project agreement between UNMA and DWRM</li> </ul>
<b>Outcome 2: Efficient and effective use of hydro-meteorological and environmental information for making early warnings and long-term development plans</b>		
2.1: Technical capacity of UNMA and DWRM is strengthened by training 16 forecasters – including 8 senior and 8 junior – to build in-house capacity for producing standard and customised weather and climate forecasts and packaging hydro-meteorological data and information into a suitable format for user-agencies and local community end-users.	<ul style="list-style-type: none"> <li>▪ A team of meteorologists and hydrologists and had a benchmarking visit in Kenya Meteorology</li> <li>▪ UNMA Systems Engineer underwent training in India</li> <li>▪ Supported 9 personnel from the IP/RPs to participate in GHACOF 41&amp;42</li> <li>▪ 2 sub-national workshops held &amp; more training in 2016</li> <li>▪ Bench Marking Visit in South Africa by UNMA, OPM, DWRM, MAAIF</li> </ul>	<ul style="list-style-type: none"> <li>▪ Partially on target</li> <li>▪ See <b>Annex 5</b></li> <li>▪ Forecasters were trained, however analytical capacity of both UNMA and DWRM remains an issue</li> </ul>
2.2 Tailored weather and climate information (inc. colour-coded alerts – advisories & warnings – for flood, drought, severe weather and agricultural stresses, integrated cost-	<ul style="list-style-type: none"> <li>▪ Assessment of EWSs, CI exchange / communication &amp; dissemination channels between UNMA and stakeholders / users for application in Teso and Mt Elgon sub-regions – Implemented by DRR project in OPM, not directly by SCIEWS</li> </ul>	<ul style="list-style-type: none"> <li>▪ On target</li> <li>▪ Access to CI has improved significantly</li> </ul>

<p>benefit analyses and sector-specific risk and vulnerability maps) made accessible to decision-makers in government, private sector, civil society, development partners and local communities in the Teso and Mt Elgon sub-region</p>	<ul style="list-style-type: none"> <li>▪ CI online platform at the NECOC within DRDPM to share / disseminate tailored CI for decision makers, government staff of UNMA, DWRM, DDMPR (inc. DDMCs/SDDMCs), local communities etc - Implemented by DRR project in OPM, not directly by SCIEWS</li> <li>▪ Train hazard &amp; vulnerability mapping resource staff (from MAAIF, DRDPM, UNMA and DWRM) to produce sector-specific risk maps, using CI and vulnerability information covering disaster-prone districts in the Teso and Mt. Elgon sub-regions - 8 instead of 4 staff trained</li> <li>▪ Protocols / agreements for Climate data (CD) and CI exchange, analysis and dissemination among UNMA, DWRM, and MAAIF, DRDPM, CCU - Merged with activity 1.3</li> <li>▪ CI alerts - flood, drought, severe weather alerts plus agricultural advisories produced via integration of weather forecasts (daily, 10-day, monthly agro-met bulletins, seasonal forecasts) – targeted on end users by sector in collaboration with DWRMA, MAAIF and DDPM - Implemented by DRR project in OPM, not directly by SCIEWS. NECOC website running and DMS platform in place</li> <li>▪ The monthly U-news produced by OPM also provides a vital platform to disseminate CI.</li> <li>▪ Awareness of enhanced hydro-met services and EWSs to stakeholders – achieved via consultant in 2015; MoU / protocol for data sharing; Protocol &amp; linkages with MDAs; Integration of information and data rescue - partially completed, on-going</li> <li>▪ MAAIF has taken responsibility to work with district production officers to package CI from UNMA for dissemination to farmers</li> <li>▪ UNMA is also providing weather information through e-mail to individuals, districts-and organizations that need weather information.</li> <li>▪ Working through the local radio stations in some districts free weekly broadcast on weather information is enabling the public to plan and make informed decisions on various activities</li> </ul>	<ul style="list-style-type: none"> <li>▪ Monthly EWI bulletins are being produced by NECOC using UNMA and other data.</li> <li>▪ Seasonal forecasts are produced</li> <li>▪ 10-day forecasts are being produced</li> <li>▪ The project went country-wide from the start</li> </ul>
<p>2.3 Weather and climate information mainstreamed into national policies, annual workplans and local development including the National Policy for Disaster Preparedness and Management, and district and sub-county development plans in priority districts in the Bukedi, Busoga, Elgon, Teso, Acholi, Karamoja and Lango sub-regions.</p>	<ul style="list-style-type: none"> <li>▪ Integrate CI into district development plans – achieved for the 28 districts + 12 districts from SW Uganda.</li> <li>▪ Higher understanding of CI dissemination needs and the importance / security of hydromet stations - achieved</li> <li>▪ Review five sector-specific policies &amp; investment plans / budgets with respect to extent of CI adapted planning – See 1.3 under consultancy for cost benefit analysis.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Partially on target</li> <li>▪ Climate change is being discussed in national and district development plans, however the specific use of CI / EWI (i.e. weather forecasts) is</li> </ul>

	<ul style="list-style-type: none"> <li>▪ Build capacity in Disaster Risk Reduction – not achieved, funds reprogrammed to visibility</li> <li>▪ National Early Warning Committee / platform (at DDPM) for inter-sectoral CI sharing, inc. economic costs, sectoral risk / vulnerability, alerts / advisories – not achieved, funds reprogrammed to visibility items</li> <li>▪ National weather and CI and EWS communication and coordination strategy – achieved by consultancy on communications strategy for UNMA. Recommendations are being implemented including UNMA to increase its visibility.</li> </ul>	<ul style="list-style-type: none"> <li>▪ not yet being mainstreamed</li> <li>▪ DDPM / NECOC has a early warning platform / emergency committee meeting structure</li> </ul>
<p>2.4 Governmental and non-governmental communication channels and procedures for issuing alerts including advisories and warnings are strengthened at a national and local level including the development of an EWS dissemination national and local toolbox and mobile-based alert platforms in the Teso and Mt Elgon sub-regions.</p>	<ul style="list-style-type: none"> <li>▪ EWS creation / dissemination at national / local level with toolbox inc. gender sensitive trainer manual on the use of radio, television, print media, SMS-based partnerships, cell phones, call centers /hotlines.</li> <li>▪ Also including local methods - village chiefs, religious leaders, and school and community drama, posters etc - done in 2018 by a consultant on Multi-Hazard and Vulnerability mapping</li> <li>▪ Equip and facilitate DDPM and DDMCs to support the dissemination of CI, including call centers /hotline and internet connection at the DRDPM linked to the UNMA and DWRMA - done by the Consultant for the EWS. The Report provided baseline information on utilization of EW information at household level.</li> <li>▪ SMS-based alert system for floods, droughts, severe weather and agri-advisories for local farmers / vulnerable communities – achieved - procured 28 cell phones to link the districts; OPM also secured DMS with support from UNICEF. These have improved reporting of emergencies to and from the pilot districts with NECOC</li> <li>▪ Simulation exercises for enhanced flood, drought and severe weather preparedness to complement the SMS-alert system implemented - Implemented by OPM. Equipped / trained the districts in responding to natural hazards and disasters.</li> </ul>	<ul style="list-style-type: none"> <li>▪ On target</li> <li>▪ Systems have been put in place during the SCIEWS project and significantly strengthened due to the new availability of CD / CI from UNMA</li> <li>▪ NECOC is very active</li> <li>▪ DDMCs are active</li> </ul>
<p>2.5 Sustainable financing options – including appropriate government cost recovery arrangements, service level agreements and public-private partnerships – identified, developed and implemented for the operation and maintenance of the installed hydro-met observation, forecasting and early warning system</p>	<ul style="list-style-type: none"> <li>▪ Through the PPP arrangement UNMA is beginning to get enhanced revenue from the CAA and exploring other revenue generation options through partnership with other private sector providers (e.g. FIT Uganda)</li> <li>▪ Study to establish the viability of different sources of revenues – identified in the existing UNMA / MWE Business and Modernization Plan - Merged with 1.3</li> </ul>	<ul style="list-style-type: none"> <li>▪ Partially on target</li> <li>▪ UNMA Strategic plan and their consultant Modernisation Review are milestones that now need to be translated</li> </ul>

	<ul style="list-style-type: none"><li>▪ Implement sector-specific marketing programme for improved met services and products to the CCA and 1-2 other economic sectors that are identified as having the most potential for generating revenue - Merged with 1.3</li><li>▪ As mobile application prototype has been developed by youth innovators through a project sponsored hackathon.</li></ul>	<ul style="list-style-type: none"><li>▪ into the next phase of development from 2020/21 to 2024/25</li><li>▪ UNMA as an agency mandated to provide and sell services has been enacted under SCIEWS</li></ul>
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### Annex 3: Co-financing Table

Sources of Cofinancing <sup>1</sup>	Name of Co-financer	Description of Co-financing	Type of Cofinancing <sup>2</sup>	Confirmed at CEO Endorsement (US\$)	Amount Contributed at Stage of MTR (USD)	Expected Amount by Project Closure USD	Actual % of Expected Amount USD
GEF Partner Agencies	GFF	GEF TF-5	Grant	\$4,000,000	\$4,000,000	\$3,949,894	99
	UNDP	Strengthening Uganda's Disaster Preparedness and Management Capacities (SUDPMC)	Grant	\$3,900,000	\$3,900,000	\$3,900,000	100
	GIZ	AWS equipment & technical support	Grant	\$1,264,000	\$800,000	\$800,000	63
	World Bank / MWE	Water Management and Development Project (WMDP) - Catchment plans	In-kind	\$1,100,000	\$500,000	\$500,000	45
	ACTED	Agency for Technical Cooperation & Development - Drought Early Warning System (DEWS)	Grant	\$400,000	\$300,000	\$300,000	75
<b>UNDP &amp; Partner Sub-Total</b>				<b>\$10,664,000</b>	<b>\$9,500,000</b>	<b>\$9,449,894</b>	<b>89</b>
National Government	GoU / MWE / UNMA	budget	Grant/In-kind	\$6,000,000	\$3,000,000	\$7,000,000	117
	GoU / MWE	Joint Partnership Fund, Joint Water and Environment Sector Support Programme (JWESSP)	Grant	\$5,400,000	\$3,000,000	\$5,000,000	93
	DWRM	budget	Grant/In-kind	\$2,800,000	\$1,700,000	\$1,700,000	61
	DRDMP / OPM	budget	Grant/In-kind	\$1,500,000	\$1,000,000	\$1,000,000	67
	MAAIF / ATAAS	Agricultural Technology & Agribusiness Advisory Services - dissemination of Agri-advisories	In-kind	\$1,000,000	\$700,000	\$1,200,000	120
	ITU / UCC	International Telecommunications Union & Uganda Communication Commission	In-kind	\$300,000	\$200,000	\$200,000	67
<b>Government Sub-Total</b>				<b>\$17,000,000</b>	<b>\$9,600,000</b>	<b>\$16,100,000</b>	<b>95</b>
<b>Total</b>				<b>\$27,664,000</b>	<b>\$19,100,000</b>	<b>\$25,549,894</b>	<b>92</b>

- Sources of Co-financing may include: Bilateral Aid Agencies, Foundation, GEF Partner Agency, Local Government, National Government, Civil Society Organization, Multi-lateral agencies, Private Sector, Other
- Type of Co-financing may include: Grant, Soft Loan, Hard Loan, Guarantee, In-Kind, Other
- Government funding was not audited by the project
- Excludes PPG

## Involvement of partners in co-financing

Co-financing	Input
MWE-UNMA, budget allocation	Cost of establishing UNMA from DWRM, staff time for installation of AWSs; training of sub-national partners from 28 pilot districts; Office space for Technical Focal Person, including stationery, communication, utilities, participation in project planning meetings and monitoring visits, review of documents including BoQs for construction and analyzing Bids for equipment to be procured; provision of transport with fuel for supervision of sites for the project; Participation in briefing meetings , Board meetings and Technical Committee meetings; operations and maintenance of installed meteorological equipment.
MWE, Joint Partnership Fund, Joint Water & Environment Sector Support Programme (JWESSP)	Participation and facilitation of the quarterly Sector Review meetings, monitoring and reporting on outcomes for the sector.
UNDP Strengthening Uganda's Disaster Preparedness and Management Capacities (SUDPMC)	Supported the establishment of the National Emergency Coordination Center (NECOC); carrying out vulnerability assessments across the country and supported development of contingency plans and the District Disaster Management Committees to ensure their implementation.
DWRM budget allocation	Participation in project planning meetings and monitoring visits, review of documents including BoQs for rehabilitation of weather stations and analyzing Bids for equipment to be procured; Participation in briefing meetings, Board meetings and Technical Committee meetings. Office space for Technical Focal Person, including stationery, communication, utilities; management time for coordination of SCIEWS project activities on behalf of all the partners;
Department of Relief, Disaster Preparedness and Management (DRDMP)/OPM) budget allocation	Collection of early warning information from weather and climate information generators and communities; dissemination of early warning alerts to communities; cost of hiring staff to run the NECOC;
German Agency for International Cooperation (GIZ)	Provision of AWSs to UNMA and installation of hydrological stations in Kyoga WMZ, including technical support to the four water management zones across the country.
MWE, WB, Water Management and Development Project (WMDP)	Support to formation of the Catchment Based Water Management Structures across the country; technical support to monitoring water resource use.
MAAIF, Agricultural Technology and Agribusiness Advisory Services Programme (ATAAS)	Participation in the SCIEWS project Board and Technical Committee meetings and planning sessions; dissemination of weather forecasts to farmers across the country and building the capacity of farmers to utilize the weather products.
ACTED Drought Early Warning System	Dissemination of weather forecasts to communities in Karamoja sub-region, as well as support to the District and Sub-County Management Committees in the region.
ITU/UCC	Participation in Board, Technical Committee meetings; dialogue with the private sector partners; Support to dissemination of weather products; pilot project in Eastern Uganda.

## Annex 4: Planned Budget and Expenditures at End-term

<b>Annex: Annual Work Plan Budgets and Actual Expenditures</b>						
<b>Outcome</b>	<b>2014 USD</b>	<b>2015 USD</b>	<b>2016 USD</b>	<b>2017 USD</b>	<b>2018 USD</b>	<b>Total USD</b>
<b>Indicative Breakdown of Project Budget in Project Document:</b>						
<b>Outcome 1</b>	\$195,900	\$1,313,700	\$1,054,760	\$97,000		<b>\$2,661,360</b>
<b>Outcome 2</b>	\$273,900	\$195,675	\$254,180	\$424,885		<b>\$1,148,640</b>
<b>Project Management</b>	\$47,500	\$47,500	\$47,500	\$47,500		<b>\$190,000</b>
<b>Total</b>	<b>\$517,300</b>	<b>\$1,556,875</b>	<b>\$1,356,440</b>	<b>\$569,385</b>		<b>\$4,000,000</b>
<b>Outcome</b>	<b>2014 USD</b>	<b>2015 USD</b>	<b>2016 USD</b>	<b>2017 USD</b>	<b>2018 USD</b>	<b>Cumulative Totals at End-term date - Jan 2014 - end-June 2018</b>
<b>Annual Work Plan Budgets and Actual Expenditures Incurred through End-term:</b>						
<b>Outcome 1:</b>						
Annual Work Plan	\$213,239	\$966,610	\$1,851,653	\$71,134	\$65,700	<b>\$3,168,336</b>
Disbursed	\$138,921	\$702,702	\$1,430,590	\$794,000	\$65,700	<b>\$3,131,913</b>
Balance	\$74,318	\$263,908	\$421,063	-\$722,866	\$0	<b>\$36,423</b>
<b>Outcome 2:</b>						
Annual Work Plan	\$93,803	\$285,450	\$264,147	\$146,866	\$102,300	<b>\$892,566</b>
Disbursed	\$118,026	\$347,149	\$156,209	\$143,000	\$102,300	<b>\$866,684</b>
Balance	-\$24,223	-\$61,699	\$107,938	\$3,866	\$0	<b>\$25,882</b>
<b>Grand Totals:</b>						
Annual Work Plan	\$307,042	\$1,252,060	\$2,115,800	\$218,000	\$168,000	<b>\$4,060,902</b>
<b>Total Disbursed</b>	<b>\$256,947</b>	<b>\$1,049,851</b>	<b>\$1,586,799</b>	<b>\$937,000</b>	<b>\$168,000</b>	<b>\$3,998,597</b>
<b>Balance</b>	<b>\$50,095</b>	<b>\$202,209</b>	<b>\$529,001</b>	<b>-\$719,000</b>	<b>\$0</b>	<b>\$62,305</b>

## Annex 5: Brief review of Sectoral plans, Technical reports & Training materials

### Sectoral Plans

#### National Development Plan II (2015/16-2019/20), 344pp

The plan provides a list of NDP II Public Investment Plan Projects in the water and environment sector (Annex 6, p304/5) which includes: 'UNMA' as a NDPI Retained Project; and 'Support to Meteorology Authority' as a new NDPII Pipeline Project.

Regarding impact page74 indicates 'Natural disasters lowered the performance of the GDP by an average of 3.5% between 2010 and 2014 and their impact was equivalent to 7.5% of the GDP in 2011 (World Bank-GoU: Uganda Rainfall Deficit 2010<sup>1</sup>). The value of disaster damages and losses in 2010 and 2011 was UGX2.8 trillion or USD 1.2 billion (World Bank-GoU) and the estimated recovery and reconstruction needs was estimated at UGX423.9 billion or USD 173 million. The major natural and human-induced disasters include drought, flooding, severe storms, famine, landslides, earthquakes, wild fires and lightning, conflicts and wars, accidents, terrorism, and environmental degradation

#### MWE Water and Environment Sector Development Plan 2015/16 - 2019/20 (pp130)

**Objective:** By 2020, modern meteorological services are provided to effectively and efficiently support the various sectors of the economy.

**Strategy 1:** Overhaul, automate and inter-link the meteorological network system.

- i) Increase the type and number of automated weather and climate observation stations to meet national and international requirements. The whole system will progressively be automated and inter-linked.
- ii) Provide accurate real time, short term and long term forecasts to facilitate the effective performance of the different socio-economic sectors, including air transport, defence and security, agriculture, health, industry, construction, and water resources management.

**Strategy 2:** Strengthen observational and analytical capabilities of students and technical staff.

- i) Recruit, train and retain technical personnel to enable provision of accurate meteorological services to various users.
- ii) To introduce courses in Meteorology at Universities within Uganda.

**Strategy 3:** Create awareness and promote use of meteorological services.

- i) Develop and implement awareness programmes on the importance and use of meteorological services.
- ii) Design and disseminate sector specific meteorological application products.

**Strategy 4:** Strengthen the policy, legal and institutional framework for meteorological services.

- i) Finalize guidelines and regulations for Uganda National Meteorological Authority Act
- ii) Support and strengthen the Uganda National Meteorological Authority as established by law.

#### UNMA Strategic Plan 2015/16 - 2019/20 - Facilitating the attainment of Uganda's Vision 2040 (76pp)

GoU / UNMA's first 5-year strategic plan. The forward mentions that 'the period has witnessed an increase of automatic weather stations from 10% in 2014 to 29% in 2017.

**Executive summary** (p10) – 'UNMA strategic Plan is an implementation tool of the Water and Environment Sector Development Plan (SDP) which seeks to contribute towards the achievement of NDP II. Specifically, UNMA is in charge of overseeing the implementation and achievement of one of the Water and Environment SDP objective on increasing functionality and usage of meteorological information systems. This is envisaged to contribute to the achievement of the NDP II target on increasing automation of climate monitoring network from 20% in FY 2015/16 to 40% in FY 2019/20'

**The following interventions will be implemented during SP:**

- (i) Skilling in Data Processing, Interpretation and Forecasting
- (ii) Refurbishing and Modernizing Meteorological stations
- (iii) Routine Maintenance of Weather Stations
- (iv) Establishing and Equipping Regional Weather Station Offices
- (v) Develop policy, and strengthen the legal and institutional framework for cooperation with stakeholders
- (vi) Establishing a Planning and Business Unit
- (vii) Improving Monitoring and Evaluation
- (viii) Establishing a Baseline and Projections
- (ix) Developing & implementing awareness programs on the importance and use of meteorological services
- (x) Designing, Developing and Implementing Early Warning Systems
- (xi) Strengthening research on future climate trends and its impacts
- (xii) Training Users in interpreting and applying weather information

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<sup>1</sup> Uganda: The 2010-2011 Integrated Rainfall Variability Impacts, Needs Assessment and Drought Risk Management Strategy



- (xiii) Institutionalizing the translation of weather information releases in local languages
- (xiv) Development of Customer Tailored Products
- (xv) Establishing Working Relationships with Stakeholders
- (xvi) Instituting membership of UNMA to Lower Local Government Planning and Development Committees
- (xvii) Actualising Funding avenues for the Authority.
- (xviii) Provision of transport and logistical support to staff. 12

#### **MWE, DWRM, Uganda Catchment Management Planning Guidelines (April 2014) (83pp)**

At present all four WMZs – Victoria, Albert, Kyoga and Upper Nile – are formally established but need consolidation and operational strengthening. One of the focal areas of work of the WMZs is the preparation of Catchment Management Plans, with effective stakeholder participation, in priority catchments of the country. WMZs will have a key role in coordinating the preparation of catchment management plans.

#### **The National policy for disaster preparedness & management (2010)**

The 2010 policy is now somewhat out of date e.g. 'Outline the structure, composition and functions of the National Emergency Coordination and Operations Centre (NECOC)', thus NECOC was in the process of being established.

#### **MWE National Climate Change Policy - Transformation through Climate Change Mitigation & Adaptation 2015 (67pp)**

Not reviewed

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### **External Reports**

**Modernisation Plan for Uganda's Meteorological Services (2013)** - Feasibility Study for UNMA, funded by USDA, written by MDA.

The study recommended on a range of service requirements and provided a list of USA suppliers<sup>1</sup>. The most immediate concern raised was the need for lightning detection equipment at Entebbe in order to improve air passenger safety and possibly obligations towards International Civil Aviation Organization.

Based on the study's weather systems and service requirements, UNMA operating revenues are not anticipated to exceed operating costs, with a shortfall of US\$5-9m per year

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### **SCIEWS Technical Reports**

#### **IT Specialist**

- To assess the computer and systems requirement for ensuring proper processing of weather data and recommend specification for procurement of vital IT equipment required for the proper functionality of the information systems
- Recommended use of GSM based automatic weather data collection and transmission to replace the old message switching systems.
- Recommended that each synoptic station be equipped with a desktop computer

#### **Synoptic, Agro-Hydromet**

- To assess the status of weather stations in the country that are operated by the UNMA
- Reported that only 44 weather stations across the country were making regular reporting to UNMA
- Highlighted the urgent need to rehabilitate and expand the weather station network in the country.
- Recommended that UNMA needs to make regular inspections of stations.
- Reported that most equipment has not been calibrated in more than 20 years and recommended calibration of the equipment
- Noted inadequate technical staff, and recommended recruitment and training of technical staff.
- Noted discrepancy between records of manual and AWS and recommended that this be addressed.
- Observed that most AWS that had been installed was not operational.

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<sup>1</sup> Earth Networks is listed as a supplier of lightning equipment

- Observed that private AWS operated by private organisations were not sharing data with UNMA

**ASSESSMENT OF THE CURRENT STATUS & POTENTIAL OPTIMAL NATIONAL WEATHER MONITORING NETWORK & IT'S SUSTENANCE BY A.W. MAJUGU SYNOPTIC AGRO-HYDRO METEOROLOGICAL ANALYST (April 2015, 70pp)**

- A report to assess the upgrade requirements of UNMA's weather data collection
- In May 2015, the technical specifications for computer hardware and software required by synoptic stations were detailed

**UNMA - DIRECTORATE OF NETWORKS & OBSERVATION - Field Report on installation of the Total Solutions Automatic Weather Stations (TSAWS) under the SCIEWS project. 25th May, 2016**

- The uniqueness of the Total Solutions AWSs technology is that it will integrate lightning data from Kenya, Tanzania and Burundi. This approach of mounting the AWS on telecommunications towers has several advantages including: availability of real-time reliable data for early warning; guaranteed power supply, security and internet provided by the contracted tower
- These 5 AWSs worth about USD 500,000 is a significant investment that requires recovery strategies and sustainability strategy to ensure value for money. Hence UNMA needs to develop a business approach to its usage;
- The cost of renting the 5 towers (40,000 USD per annum) and servicing the system (US\$210,000 per annum), need to be factored in UNMA's Budget with effect from 2017. This will be a subject of resource mobilization as the SCIEWS project has limited resources that cannot provide for this item.
- The 5 units of AWSs were delivered and installed as scheduled. Being a new technology and the first of its kind in Africa, there is a lot of learning to be undertaken and hence initially there will be some reliance on the CIRDA Technology Transfer Specialist and the Earth Network Technical expertise so as to ensure proper utilization of the equipment.

**Hydromet AWLSs**

- To assess the status of water level equipment across the country under the DWRM
- DWRM July 2015 found the consultant unable to deliver according to the TOR

**Meteorological Communication Strategy – UNMA (2015, pp73)**

- An UNMA planning document produced for SCIEWS

**Protocol & Agreements / Information & Protocol Specialist**

- to assess the issues relating to sharing data between UNMA and the DWRM and design a protocol and agreement with the Standard Operating Procedures to be used by the two partners – these were not successful under SCIEWS
- to assess the issues relating to sharing data among Ministries, Departments and Agencies (MDAs) and design a Protocol and Agreement with the Standard Operating Procedures to be used by the MDAs – not agreed under SCIEWS

**Monitoring and Evaluation Framework (March 2015) pp 111**

- The objective was to review the baselines and indicators in the project document and design tools for monitoring the project during its implementation
- Page 35 introduces the concept of monitoring farmers receiving (or not) EWS information (with no separate mention of seasonal agri-advisories for example), but wraps-up the monitoring needs in jargon (Randomized Controlled Trials) [which were actually part of the M&E TOR]
- Page 39 (Annex 1) provides a list of 61 indicators without any link to the Prodoc or scorecards (AMAT, Capacity)
- Page 48 (Annex 3) re-iterates the prodoc indicators, baselines and targets
- Page 101 (Annex 10) indicates the need for a household survey

In brief, the report lacks any simple, feasible M&E plan with an appointed PMU staff member to coordinate, collate, and analyse the data collected.

**Meteorology and Hydrology Contribution to Gross Domestic Product (June 2018), pp74**

- This study was undertaken to identify sources of revenue for sustaining UNMA's operations and marketing its products.

**Weather & Climate Information Cost/Benefit and Marketing Analysis, (March 2015, pp89)**

- Significant investment is required to improve provision of weather and climate information
- Commercialization of weather products will take time and will only be viable if UNMA develops public interest

- and improves on reliability of its products
- UNMA needs to create awareness about the value of weather and climate information especially to the private sector.
- UNMA would also need to plan and budget for a substantial amount for the maintenance of equipment, capacity development and well as for product development
- Benefits arising from improved provision of climate information include reduction in human losses and from disasters, reduction of lead time for early warning.
- Found the cost recovery arrangements between UNMA and CCA to be dysfunction and recommended for these to be renewed.
- Proposed that with CAA support, airline companies could be charged directly for weather information

#### **Communications Specialist**

- to design a Communications Strategy for UNMA in order to improve its visibility
- The goal of UNMA's strategic communication programme is to establish an efficient communication and public relations function to enable the organization effectively generate and deliver quality weather, climate and early warning information
- Objectives of the communication strategy include i) strengthening and broadening appreciation, appeal and reach of meteorological information, education and communications interventions, ii) positioning UNMA to project itself as the lead agency for the management of weather, climate and early warning information, and iii) increasing the availability, accessibility and uptake of information about UNMA and its products.
- Result areas include i) building capacity of UNMA to communicate and relate effectively with its internal stakeholders, ii) undertaking UNMA branding overall image and identity, iii) streamlining communication and public relations functions of UNMA and ensure proper coordination across its directorates, iv) building and sustaining productive relations with the media, v) improving public understanding of meteorology and uptake of weather, climate and early warning information and vi) providing tailored weather, climate and early warning to grassroot users.

#### **Hazard and Vulnerability Mapping Training**

- To equip a critical mass of partners to become resource persons for training other partners in mapping hazards and vulnerability to climate change
- Objectives of the training was to train technical staff from 4 agencies in hazard and vulnerability mapping in order to produce sector specific risk maps. Another objective of the training was to liaise with key partners to ensure operationalization of resources within NECOC
- Training was conducted by department of Geography Geomatics and Climate Sciences at Makerere University
- 8 technical staff from DRDPM, MAAIF, UNMA and DWRM were trained in use of spatial data, use of NDVI analysis for land cover and food security analysis, hazards (floods, drought and landslides mapping and analysis, then in vulnerability analysis and mapping.

#### **GIS Based Hazard and Vulnerability Mapping - Training Manual (August 2015, pp114)**

- There is no name on the manual or project / UNDP logo or introduction. The manual is methodology to use ArcInfo software to produce hazard maps. It is not clear that this was a SCIEWS output, or what is the link to any existing organisations (MWE, DWRM, OPM) who might be producing hazard maps or catchment-based maps

#### **EWS Households survey**

- To establish baseline for early warning at household level – the TE was not given access to this report

#### **Mid Term Review**

- Dated November 2016. 66pp including 15 for annexes.

#### **Filming the project**

- A 7.5 minute video about the importance of weather and climate information for agriculture and disaster preparedness and management was developed in 2016 ([www.youtube.com/watch?v=xa6oc5WkwY](http://www.youtube.com/watch?v=xa6oc5WkwY))

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## **Training**

		VENUE	BENEFICIARY	OBJECTIVE	OUTCOME
20 14	3-8 Aug	Kenya Met Department (KMD) and Nzoia basin	6 Board Members of UNMA 2 UNMA personnel.	Orientation of UNMA Board, Management KMD	The leadership of UNMA was set on the path of modernization and improvement of quality of weather products and services
20 14	13-16 Oct	Dar salaam Tanzania	1 UNMA and 1 DWRM Personnel	Climate Information for Resilient Development in Africa (CIRDA) Training	Participants had a clear perspective to observation network for monitoring weather and climate, for mitigating the effects of climate change.
20 14	6-31 Oct	Kenya Meteorological Department - Nairobi	2 UNMA personnel	Instruments calibration and maintenance Training	Improved understanding of UNMA to set up its own calibration and maintenance system for sustainability of their services.
20 15	10-14 Aug	Philippine Weather Service (PAGASA)	2 UNMA personnel	Benchmarking weather early warning	Acquired skills on customization of weather monitoring system at affordable rates
20 15	3-8 May	KMD	1 UNMA IT personnel	Onsite observation of linkage of synoptic stations to the regional hub in Nairobi	Uganda weather products are now linked to the Global Telecommunication Network of weather service providers
20 15	1-30 Sept	KMD	2 UNMA Personnel	Numerical Weather prediction	Improved skill in modelling weather products
20 15	1-5 Sept	KMD	2 UNMA Personnel	General Forecasting	Deepened forecasting techniques.
20 15	24 Oct- 8 Nov.	India	1 UNMA IT Personnel	IT Information Library and Project Management Professional Certification Combo Training	Enhanced performance in planning and managing data digitization and archiving weather information for future historical reference and planning
20 15	26 Sept – 3 <sup>rd</sup> Oct	Washington DC, Maryland & Oklahoma	2 UNMA Personnel	Sub Saharan Africa Climate Information and Early Warning Systems Training	Orientation on issues relating to technology transfer and modernization of meteorological services
20 15	17-30 Aug 1-5 Sept	Mukono & Mbale	8 Personnel from MAAIF, MWE, OPM, DWRM, MLHUD, UNMA	Hazards and Vulnerability Mapping Training	A resource of trained trainers in Hazard and Vulnerability mapping is available to the Government Departments
20 15	19-24 Oct	KMD	10 DWRM Personnel	Training of Senior and Junior Hydrologists on region-specific water resource issues	Technical team were on the job-mentored in flood and water resources forecasting
20 15	8-15 Nov	KMD and Nzoia basin/ water catchment	10 DWRM Technical personnel (2 women and 8 men)	To benchmark and draw lessons from the hydro-meteorological early warning system in Kenya.	Better understanding of modelling a Community Based EWS, and linking the hydrological with the weather gauge information systems, and the dissemination systems; real-time monitoring system and flood disaster management system.
20 16	12-15 Sept	Eastern Uganda	3 UNMA Personnel	Adcon Training on maintenance and usage of AWS	Trained personnel can install and maintain automatic weather stations(AWS)
20 16	23-26 Oct	Kampala	24 UNMA Personnel	Earth Network Training	Personnel can monitor weather and storms using satellite based system
20 16	11-22 March	Entebbe	26 UNMA Personnel	UNMA Training on Automatic Message Switching System	Trained personnel can track weather information transmitted from the weather stations and linkage to the regional hub.
20 16	12 <sup>th</sup> - 17 <sup>th</sup>	Eastern Uganda	30 data collectors	Collecting disaster data from sub-counties in disaster prone areas	Data collected fed into the Disaster Database (DesInventar)
20 16	4-8 July	At Elgon Hotel Mbale.	30 Government and District officials from Eastern Uganda	Disaster Risk Reduction Data Collection Training	District participants can receive and send emergency data to the National Emergency Coordination Center (NECOC) in the Office of the Prime Minister
20 16	28-31	Soroti	44 District Technical	Training of District & County	District Planners, Livestock, Agriculture

17	March		personnel from 28 Pilot Districts	Technical Officers from Kyoga Water Management Basin(KWEB)	Extension Workers, Environment Officers equipped in climate weather collection, analysis and dissemination
20 17	29/mar-12 <sup>th</sup> April	Sezibwa, Muyembe, Wambabya, Wamala, Kanyampara and Kibaale stations	7 DWRM Technical personnel	Training of 4 Metaset and 2 non-metaset stations under by SEBA	DWRM acquired practical skills in installing and maintaining automatic water level stations
20 17	24-26 July	Ridar Hotel Mukono	40 UNMA personnel	Gender Training	UNMA personnel can mainstream gender in their plan, budget and reporting
20 17	16-19 July	Protea Hotel Entebbe	2 OPM & 2 UNMA Personnel	Transformational Development Approach Training	Improved results based management of programming
20 17	22-27 Oct	South African Weather Service (SAWS)	Senior Management and Technical Officers from UNMA, DWRM, OPM and MAAIF	Bench mark modernization of hydromet services	A better understanding of the strategic importance of weather and water resources management including sustainability of the services in the face of climate change.
20 14- 17		Various	17 UNMA, OPM, DWRM, MAAIF personnel	Participating in the Great Horn of Africa Climate Outlook (GHACOF)	Modelling seasonal forecast for the region as well as Uganda specific weather forecast

### Notes

- Training is reported to be largely effective. Training on a regional level via KMD for example at their regional centre has been on a higher level, that that nationally conducted.
- The visit to the Philippines was not an official visit, but rather a fact-finding visit to see Earth Networks

### CIRDA Training Courses

#### Regional Workshops and Trainings

13-14 April, 2014 Regional Inception Workshop and Technological Expo with Innovative Hydromet Equipment and Services- Addis Ababa, Ethiopia

- 2 participants from Uganda Attended the Workshop. The programme designed the workshop with technical content and also invited vendors to present innovative equipment. This activity benefitted all regional actors.

14-16 October, 2014 Regional Workshop for a Systems Approach to Designing, Implementing, and Utilizing Observing Networks Regional Workshop- Dar Es Salaam, Tanzania

- 4 participants from Uganda Attended the Workshop. The programme designed the workshop with technical content and high value speakers. It also provide clinics with country representatives and key experts to help in the initial design of the national projects

3-5 March, 2015 Building a sustainable climate change adaptation and economic development plan: Creating Value Added Weather and Climate Services through Innovative Public Private Partnerships- Kampala Uganda

- 25 participants from Uganda participated including participants from agriculture, aviation, civil society, water, finance and insurance sector. CIRDA designed the training including identifying private sector speakers to provide matchmaking opportunities based on interest defined by countries. This included aviation, insurance, telecommunications, technology, etc. It also identified best practices relevant for the region. As a result of this workshop Uganda developed an MoU with HNI and began to identify various opportunities for cost sharing.
- In country mission was held a week prior to the event allowing for programme experts to meet with national counterparts to trouble shoot, provide better needs assessment and deliver possible solutions.

25-27 August, 2015 Project Manager Knowledge Sharing Workshop- Addis Ababa, Ethiopia

- 4 participants from Uganda attended. The programme designed the content with the support of team experts and provided the training and discussion on lessons learned, CIRDA available tools, mission reporting, etc.

15-17 March, 2016, Regional Workshop: The Last Mile (Focused on End User Needs and Information Delivery)

- 5 participants from Uganda attended, one included a speaker from the telecommunications company FIT Uganda. Within the project a Hackathon was held with young web programmers that used available climate data to demonstrate the type of services that could be made available and designed with climate data. As a result of this event Uganda held its own a year after (2017 Weather Innovations Challenge/ Hackathon). For this event, CIRDA Experts provided support in organization, outreaching to various developer organizations and reviewing content. Country clinics were also held on a one to one basis with each national team and project experts.

29 November- 1 December, 2017 Regional Workshop Towards Sustainability for Climate Information Services: Achievements, Impacts, Lessons Learned and Next Steps

- 2 participants from Uganda attended. In country clinics were held per national delegation with CIRDA experts focused on helping trouble shoot and providing support in developing transition of project to national governments within a sustainability strategy. Within the framework of this workshop CIRDA organized and financed a training on data assimilation delivered by Adcon. This was targeted to technical specialists within the NHMS to integrate data from various sources. Two specialists from Uganda attended this highly specialized technical training.

#### South-South and Knowledge Exchange Missions

2015: representatives from Uganda (2) traveled to the Philippines for a South-South Exchange on the use of cost effective innovative technologies to enhance national observing networks. The exchange was led by the Weather Philippines Foundation (WPF) and was based on their own experiences to increase their local network through 1000 additional AWS. Funds for travel and the development of the agenda was arranged by CIRDA Experts.

The CIRDA Programme also funded the participation of the Director of UNMA to the 2016 COP 22 held in Marrakech, Morocco. The participation was to attend as a speaker of the side event “Innovative Approaches to Weather and Climate Services in Africa.”

#### Country Support Missions

In 2014, the Programme arranged 4 missions providing support to Malawi, Tanzania, Ethiopia, Uganda and meeting with national implementers to gauge their concerns.

In 2015, CIRDA Country support specialists were deployed to Uganda twice for in country missions (March and June). During these extensive discussions with the Uganda National Meteorological Authority were held. UNMA stated its interest to use the full solution option (equipment, products and services) offered under the LTA. Meetings with mobile telephone providers were also held.

In 2016, country support specialists were deployed twice to Uganda (May, June). During these in country support was provided on PPPs and product development, design and support in the installation of an integrated network of synoptic stations, AWS and lightning sensors, including the facilitation of discussions between telephone network operators, developed a training plan to ensure effective skills transfer for equipment maintenance.

2017, 1 mission to Uganda (June) was held to support the DWRM in installing the remaining weather stations. A CIRDA Expert travelled and ensure their correct installation.

#### Technology and Innovation Procurement Support

During the first months of the year two Long Term Agreements became operational with two providers of hydrological and meteorological equipment- Ubimet and Earth Networks. The LTAs provide for a comprehensive array of installation, training, operations, and maintenance services to bolster national capacities in collecting and delivering climate and weather information for early warning services. Throughout the year CIRDA Experts worked with Uganda, the Gambia Malawi, Liberia and Sierra Leone and Burkina Faso in finding how to best adapt these technologies and services to expand their current early warning and communication capacities. As a result, Uganda, Liberia and Sierra Leone have concluded procuring and installing an end to EWS to allow the communication of tailored forecasting and access to real time data. In the case of Sierra Leone and Liberia, service contracts are in negotiation to provide support in expanding national operational capacities.

CIRDA Experts reviewed the specification of procurement of equipment and services for hydromet equipment. This was under the access of LTAs and Procurement Support Unit (PSU) that were developed and funded by CIRDA through the signing of an MoU with the PSU. Support was also provided to the CO in the negotiation of contracts for services from EN. The results from these resulted in more favorable terms, amongst these the inclusion of refresher courses on technology previously acquired. CIRDA

Support in reviewing various TORs at PM Management request including those on a study to identify the contribution of Hydromet Services to GDP.

#### Market Study and Knowledge Management Products

A multi country market study was commissioned to provide critical baseline information and help further develop the Programme's private sector strategy. This included interviews with key stakeholders from all partner countries and proceeded in making national capacity assessments for engagement with PPPs. The document was presented in 2015 and was recently updated per Uganda's request. This market study has proven to be the first of its kind for the region and is currently being used by national partners. The study concluded that while there is an important demand current capacities in NHMS's are not able to meet them. It provided possible partnerships that can be enacted to provide quality information in a manner that may be attractive to various industries. It also advised on the opportunities to engage with private sector weather companies. <http://adaptation-undp.org/resources/knowledge-products/climate-andweather-services-market-assessment-revenue-generating>

The experience from this study let Uganda to hold a multi stakeholder discussion in 2016 inviting many key private sector actors. The programme was able to provide support for this effort that led to the establishment of various MoUs for last mile services. Support included in designing the agenda, identifying potential participants, reviewing the event concept note and having a country support expert travel to Uganda (travel costs were incurred by Uganda CI/EWS with expert honorariums for planning and time spent in Uganda where covered by CIRDA).

A publication on private engagement and the potential for establish public private partnerships to provide life- saving climate information was prepared and presented during the COP 22 Meetings. The publication relied on information from the field with contributions from our country partners. The publication also received contributions from key weather experts and practioners and went through an extensive peer review process. The publication has generated much interest as has been identified through the increased numbers of downloads and shares on social media. <http://adaptation-undp.org/resources/communications-products/new-vision-weather-and-climateservices-africa>

A communications toolkit was prepared and presented during the Zambia Regional Workshop. The toolkit was designed to support country efforts in communicating climate information to end users. During the workshop and in successive country support, discussion on how to best utilize the resource was done. <http://adaptation-undp.org/resources/training-tools/climate-information-and-early-warningsystems-communications-toolkit>

#### Digitization Support

Climate data in a digital format allows practical climate analyses and reduces the time required for NMHS to provide information and services. During the Programme's Inception Workshop, the lack of access to digitized data was highlighted by NHMSs as a key obstacle in their efforts to develop decision relevant products and communicate climate information to end users.

In 2014, CIRDA sent all partner countries an initial survey to assess national interest and needs to for digitization support. Uganda, Tanzania, the Gambia, Sierra Leone, Malawi, Zambia demonstrated the most interest. Two experts where commissioned by CIRDA to Uganda, Tanzania, the Gambia, Sierra Leone, Malawi, Zambia to discuss digitization needs with key ministries and agencies in each country. The experts provided a detailed assessment of needs and an estimated budget. The visit demonstrated a desire by most NHMSs to digitize information relevant to agriculture, fishing and flood management (rainfall, temperature, salinity, wind speed etc.)

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## **SCIEWS Forerunner / Baseline Projects**

- The Water Management and Development Project (WMDP) (2013 – 2018) is funded by the WB and implemented by the MWE and National Water and Sewerage Corporation (NWSC). The objectives of WDMP are to improve water resource planning, management and development, as well as access to water and sanitation in priority areas. The total financing for the project is US\$ 135 million, of which US\$ 1.1 million has been allocated for flood and drought risk assessment, management and preparedness.
- The Joint Water and Environment Sector Support Programme (JWESSP) (July 2013 - June 2018) is a follow-up to the present Joint Water and Sanitation Sub-sector Support Programme (2007-June 2013) and being implemented by MWE. At present, the total funding for the implementation of activities under these components includes: i) donor partner funding of € 175 million from KfW (Germany), AfDB, EU, Austria, and Denmark; and ii) GoU funding of € 195 million.
- Reform of the Urban Water and Sanitation Sector (RUWASS) programme (2002-2014) was established by GIZ in 2002 to provide advisory services to the MWE, including providing support to the Department of Water Development, National Water and Sewerage Corporation (NWSC), Directorate of Water Resource Management and the Department of Meteorology. The programme is currently in phase 4 (2011-2014), which includes

building capacity of DWRM and DoM and funding weather and climate monitoring equipment and data management solutions.

- UNDP's Strengthening Uganda's Disaster Preparedness and Management Capacities (2012-2014) project is working towards addressing the needs for effective disaster risk reduction at a national and local level in Uganda with funding of US\$ 3.9 million. This is a follow up project to the UNDP's "Support in Preparation of a National Disaster Management Policy" from 2006-2009 (US\$ 4 million).
- ACTED Drought Early Warning System (DEWS) in Karamoja in cooperation with national and local government, has developed a DEWs for the Karamoja sub-region. The programme is funded by the European Commission (ECHO) and started in 2008. The DEWS provides drought warnings to communities in Karamoja through a monthly bulletin based on drought indicators gathered by community-based monitors and district officials and analysed by specially designed software.
- The International Telecommunications Union and Uganda Communication Commission (ITU/UCC) is implementing the project, "Natural Disaster Early Warning System Pilot in Uganda". The total funding for this pilot project is US\$ 300,000 with the period yet to be confirmed. The focus of the ITU/UCC project on the dissemination of early flood warnings alerts via SMS is well-aligned with the activities of the LDCF project.
- Agricultural Technology and Agribusiness Advisory Services (ATAAS) (2010-2015) aims to increase agricultural productivity and household income of participating communities in Uganda by initiating improvements in agricultural technology and advisory services and undertaking agricultural research. The total project cost is US\$ 665 million, financed primarily by the GoU (US\$ 497 million) and World Bank (US\$ 120 million loan), with support from the EU, IFAD and Danida. Component 2 (US\$ 72.4 million) and 3(US\$ 317.8 million)



## Annex 6: List of Persons Interviewed

Date	Location	Organization	Name	Position/ Responsibility	email
09 July 2018	Kampala	UNDP/SCIEWS	Pascal Onegiu Okello	Project Manager SCIEWS	pascalokello@yahoo.co.uk (pascal.okello@undp.org)
09 July 2018	Kampala	UNDP	Daniel McMondo		daniel.omodo@undp.org
11 July 2018	Entebbe	UNMA/Entebbe Weather Station	Fred Sebabi	Weather forecaster	
11 July 2018	Entebbe	DWRM	Tom Kanyike	Principal Hydrologist	shokar@techie.com
11 July 2018	Entebbe	DWRM	Gastone Osiimwe	Senior Water Officer	ossiimwe@gmail.com
11 July 2018	Entebbe	DWRM	Kyewe Aggrey	Senior Hydrological Inspector	aggreykyewe@gmail.com
11 July 2018	Entebbe	DWRM	Eng. Nebert Wobusobozi	Commissioner DWRM, Rtd	
11 July 2018	Entebbe	DWRM	Zaake Benon	Assistant Commissioner	bzaake@yahoo.com
11 July 2018	DWRM	DWRM	Aimo Faima	Hydrologist	Afaima12.aimo@gmail.com
11 July 2018	Entebbe	MAAIF	Luvumu Eve	Principal Agric. Extension Coordinator	luvumueve@gmail.com
12 July 2018	Kampala	UNMA	Milton WAiswa	Weather station Network Manager	mmwaiswa@gmail.com
12 July 2018	Jinja	Jinja District Local Govt	Ibanda Musa	Ag. DAO	lbanda.musa@gmail.com
12 July 2018	Jinja	Jinja District Local Govt	Kaggwa Stephen	Agricultural Officer	kshaphan@gmail.com
12 July 2018	Mayuge	Mayuge District Local Govt	Waluube Paul	Agricultural Officer	pwaluube@yahoo.com
13 July 2018	Kaptchorwa	DWRM	Maximo Twinomuhangi	Kyoga Water Management Zone	mtwinomuhangi@gmail.com
13 July 2018	Bulambuli	Bulambuli District Local Govt			
13 July 2018	Tororo	Tororo District Local Govt	Aol Evelyne	Senior Environmental Officer	aolyoga31@yahoo.com
14 July 2018	Kumi	Kumi District Local Government	Iisa Augustine	Ongino Subcounty	aagustineisa@yahoo.com
14 July 2018	Ongino Subcounty	Ongino Police Station	Walugendo Ramathani	Ongino Subcounty	
	Ongino Subcounty	Ongino Police Station	Ogobia Simon Peter	Ongino Subcounty	0774914501
16 July 2018	Ngetta, Lira	NARO Ngetta ZARDI	Obong Yuventino	Agronomists/Research Officer	Obong2obua@gmial.com
16 July 2018	Ngetta, Lira	UNMA	Edyellu Francis	Officer in charge	Francisedyellu32@gmail.com
16 July 2018	Gulu	Gulu District Local Govt	Lakor Jackskon	District Production department	lakorjackson@yahoo.com
17 July 2018	Kiryandongo		Ruth Mubala	Admin & Human Resources officer	
18 July 2018	Kampala	UNMA	Godfrey Mujuni	Manager- Data Center	grmujuni@gmail.com
18 July 2018	Kampala	UNMA	Otim Faustine Charles Obeke	Senior Meteorologist	obeke.otim@gmail.com
18 July 2018	Kampala	UNDP/NECOC	Rohan Moray	Information Management Specialist	Rohan.soray@undp.org
18 July 2018	Kampala	Office of the Prime Minister	Solomon Elungat	Senior Disaster Reduction Officer	elungats@yahoo.com
20 July 2018	Entebbe	NMC	Aggrey Taire	Weather Forecaster	Mtaire-agg@yahoo.com

## Annex 7: List of Documents Reviewed

1. Project Identification Form (PIF) and GEF FA strategic program objectives
2. UNDP Initiation Plan and Implementing/Executing partner arrangements / contract
3. UNDP Project Document and Logframe revisions
4. CEO Endorsement Request
5. UNDP Environmental and Social Screening results
6. Project Inception Report
7. Project Implementation Reports (PIRs)
8. Annual Project Reports
9. Minutes of the Project Board Meetings and other meetings (i.e. Project Appraisal Committee meetings) - LPAC, 27 April 2010, Minutes of LPAC Meeting;
10. Atlas Risk Register
11. Quarterly progress reports and work plans of the various implementation task teams
12. Annual Work Plans
13. Mid Term Review (MTR) Report
14. MTR Management Response
15. M&E Data management system
16. Audit reports
17. METT, Capacity Development & Financial Scorecard - Tracking Tools at CEO endorsement, midterm and end term (METT - November 2009, November 2016 and March 2017).
18. Oversight mission reports by the project manager, RTA, and others
19. Monitoring reports prepared by the project
20. Financial and Administration guidelines used by Project Team
21. Co-financing realized, itemized according to template provided by TE team
22. Financial expenditures, itemized according to template provided by TE team
23. Project operational guidelines, manuals and systems
24. UNDP Development Assistance Framework (UNDAF/ICF) and Evaluation
25. UNDP Country Programme Document (CPD) and Country Programme Action Plan (CPAP)
26. Project site location maps
27. Project activity maps with management actions and intervention
28. Technical consultancy reports
29. Training materials (PPTs etc.)
30. News and Awareness materials / Photo library / Video films about the projects
31. Project Summary PowerPoint files for the TE

## Annex 8: Risk Tables

### Atlas Risk Table (edited)

The Atlas Risk table is taken from the UNDP management system (all dated 23/1/2014). It identified 7 risks. These are presented here, with the TE comment.

Identified Risk & Management Response (MR)	Category/Level	TE comment (2018)
	Env	
Climate shocks result in damage to SCIEWS equipment which affects the communities Delay in equipment procurement Delay in baseline / co-financing projects affects SCIEWS	Org	- did not occur - delays due to identification of best equipment type, not procurement - co-financing was achieved
Alerts and warnings required by communities are not feasible to produce due to scientific or technological failure. MR - intensive capacity building of relevant UNMA staff has been carried out and prepared them to apply the new technology procured.	-	- Alerts were produced and capacity built
Lack of commitment from communities where EWS are established undermines the effectiveness of the project demonstrations. MR - Sensitization of communities will be carried out. A cost/benefit analysis demonstrating the benefits of climate information will be disseminated	Political	- Lack of awareness building for communities near AWLSs to stop criminal damage – was not addressed by the project, which was a short-coming
Local telecommunications restricts the transfer of data from installed equipment to necessary recipients, and restricts communication amongst key players / end-users. MR - The dissemination model that will be applied take into consideration existing ICT and telecommunication infrastructure	Op	- not an issue
Installed hydro-meteorological equipment fails because it is vandalised or not maintained. MR - Fencing of equipment and community engagement	Security	Engagement funds were cut due to changes in equipment bought. This resulted in a lack of community engagement with resultant damage to equipment – project short-coming

### Risk Table (Final Report, June 2018)

Risks identified	Mitigation/reduction measures undertaken	Risk Level	Remarks	TE Comment
Delayed implementation of baseline projects by the Government and Donors negatively affects LDCF project outcomes.	The PB, PTC and key partners were actively involved in tracking and guiding project implementation	1	On track	- co-financing was realised
Failure to maintain / vandalized installed hydro-meteorological equipment.	O&M System in place; Installed weather stations have full time (24 Hrs) personnel on duty; Fencing and permanent structures were constructed for the hydro stations. The Sub-National Partners and the Water Management Zone (WMZ) structures have been linked to communities for security and sustainability of services	2	Constant surveillance of the equipment required.	- issue not solved, which had made a negative dent on DWRM / SCIEWS
Local information technology and telecommunications infrastructure restricts the transfer of data from installed equipment to necessary recipients, and restricts communication	IT consultants were hired and in collaboration with Kenya Met. Dept. aligned the Fibre Optics in Entebbe	1	On track	- the lack of an up to date telecoms agreement for the NMC is a key issue. The lack of bandwidth, uninterrupted connectivity etc means that key systems for short-term forecasting (for use by aviation

amongst key role players and end-users.				at Entebbe and across Uganda) are not fully operational. - for the TE it did not appear that fibre-optic cabling was in use, due to the above and the number of systems that were off-line when the TE visited. - This a project short-coming
Procurement and installation of hydro-met equipment, including hardware & software, is delayed because of complications with the release of funds and/or national procurement procedures.	Effective administrative planning was undertaken and procurement using UNDP ensured timely delivery of outputs from international as well as national sources.	2	Procurement of civil works for hydro stations and installation of AWLSs finalized in June 2018.	- the lack of telemetry at AWLSs has affected having a EW – flood warning system
Lack of commitment from communities where EWS are established undermines the effectiveness of the project demonstrations.	The project avoided a ‘top down’ approach and created as sense of District ownership of the EWSs.	2	Linkage with Water Management Zone structures ensured community participation in the operations and maintenance.	- There is a need for a SCIEWS II project to make CI / EWI more effective at local level and another project to support government planned catchment-based water resources management planning
Alerts and warnings required by communities are not feasible to produce due to scientific or technological failure and social acceptance.	Key personnel from implementing or responsible partners were trained on the current scientific and technical skills of hydro-meteorological systems. The UNDP-CIRDA team and suppliers of equipment provided technical backstopping to the project.	2	Conduct annual refresher training to Implementing partners, and translation of weather information to local languages.	- CI / EWI is being produced as a result of SCIEWS and NECOC (which was also supported by a forerunner UNDP project)
Electioneering affecting timely participation of District stakeholders including targeted communities and district stakeholders in project work	Ensured participatory planning with stakeholders before implementation of an activity.	1	On track. No incidences occurred.	- not an issue
Inflation and currency fluctuations affecting the price of products and services and performance of the Budget.	Constant budget review and revision of the Annual Spending Limit to match the delivery target.	1	On track. Implemented within Authorized Spending Limit (ASL)	- not an issue
Inadequate technical capacity of the Responsible /Implementing Partners to deliver outputs	In-house and external training and mentoring of key staff was undertaken for skilling.	2	Necessary to match job requirements with available skills.	- more training / capacity building needs to be done on maintaining equipment, telecom needs and analytical powers to forecast climate – a Phase II SCIEWS is recommended
Inadequate capacity of Responsible and Implementing Partners in financial controls	A Financial Authorization Certification of Expenditure (FACE) was instituted for monitoring project account; Most Financial resources managed via UNDP system.	1	On track; IP&RPs were trained by UNDP in financial management.	- not an issue

## Annex 9: Stakeholder List

Stakeholder	Roles and Responsibilities
MoFPED	Overall financial oversight for the project
MWE (DWRM)	DWRM within the Directorate of Water Resource Management under MWE is the entity mandated with the responsibility for operating and maintaining a surface hydrological monitoring network of 80 hydrometric stations (rivers and lakes) and 10 automatic weather stations. Hydrometric stations include manual as well as automatic water level recorders and data loggers for measuring water levels. Observers take manual readings twice a day and data is collected from data loggers only on a monthly basis. These manual flow meter measurements are then sent to the DWRM, either weekly or monthly via post or telephone, often resulting in critical delays, which reduces the effectiveness of these data for warnings of flood levels. At present, a number of the water resources management functions under the DWRM are in the process of being decentralised to regional levels. This is being achieved through the establishment and refinement of four Water Management Zones (WMZs), namely the Kyoga, Victoria, Albert and Upper Nile WMZs, under the DWRM's framework for Catchment-based Water Resources Management (CbWRM) that is at present being operationalized across Uganda. There are a number of factors which limit the capacity of the DWRM for water resource monitoring and assessment. Spatial coverage of the country's hydrological monitoring network has been reduced as a result of vandalism or poor maintenance of equipment. At present, automated real-time water level measurements are available for only the Kyoga WMZ, which limits the capacity of the DWRM to generate and disseminate rapid warnings for inundation and flash floods.
MWE (UNMA)	UNMA within the DEA under MWE is the institution mandated with the responsibility for establishing and maintaining the weather and climate observation network in Uganda, including inter alia data collection, analyses and exchange as well as the production of weather and climate information and products. UNMA operates a weather and climate observation network
DDRM	DDPM under the OPM is the agency mandated with the responsibility for disaster preparedness and management in the country. Activities of the DRDPM include the coordination of risk reduction, prevention, preparedness, mitigation and response actions in the country in consultation with other line ministries, humanitarian and development partners, local government and the Private sector. It co-chairs the National Platform for Disaster Management Inter Agency Technical Committee, which includes members from MAAIF, DoM, DWRM and DDPM. The DDPM coordinates and houses the National Early Warning System Committee. However, there is poor coordination and communication between the DRDPM and Uganda's Hydrometeorological agencies, in addition to which there are multiple factors which limit the ability of hydromet staff to monitor and forecast climate and weather-related information. As a result, the DRDPM has a limited capacity to implement appropriate timely responses to climate-related hazards.

Source: Prodoc

## Annex 10: Rating Scales

The following UNDP-GEF grading scales were applied in the evaluation

### Evaluation Criteria

Criteria	Definition
<b>Effectiveness - Objective</b>	- The extent to which an objective has been achieved or how likely it is to be achieved.
<b>Effectiveness - Outcomes</b>	- Results include direct project outputs, short to medium-term outcomes
<b>Relevance</b>	<ul style="list-style-type: none"> <li>- The extent to which the activity is suited to local and national development priorities and organizational policies, including changes over time.</li> <li>- The extent to which the project is in line with the GEF Operational Programs or the strategic priorities under which the project was funded.</li> </ul> <p>(Retrospectively, relevance often becomes a question as to whether the objectives of an intervention or its design are still appropriate given changed circumstances.)</p>
<b>Efficiency</b>	- The extent to which results have been delivered with the least costly resources possible; also called cost effectiveness or efficacy.
<b>Sustainability</b>	<ul style="list-style-type: none"> <li>- The likely ability of an intervention to continue to deliver benefits for an extended period of time after completion</li> <li>- Projects need to be environmentally, as well as financially and socially sustainable</li> </ul>
<b>Impact</b>	<ul style="list-style-type: none"> <li>- The positive and negative, foreseen and unforeseen changes to and effects produced by a development intervention.</li> <li>- Longer term impact including global environmental benefits, replication effects and other local effects.</li> </ul>

### Rating Scale for Outcomes (Overall, Effectiveness & Efficiency)

<b>Highly Satisfactory (HS)</b>	The project had no shortcomings in the achievement of its objectives in terms of effectiveness (outcomes), or efficiency. The project is expected or has achieved its global environmental objectives. The project can be presented as 'good practice'.
<b>Satisfactory (S)</b>	There were only minor shortcomings The project is expected or has achieved most of its global environmental objectives.
<b>Moderately Satisfactory (MS)</b>	There were moderate shortcomings The project is expected or has achieved most of its relevant objectives but with moderate / significant shortcomings or modest overall relevance. The project isn't going to achieve some of its key global environmental objectives
<b>Moderately Unsatisfactory (MU)</b>	The project had significant shortcomings The project is expected to achieve its global environmental objectives with major shortcomings or is expected to achieve only some of its major global environmental objectives.
<b>Unsatisfactory (U)</b>	There were major shortcomings in the achievement of project objectives in terms of effectiveness, or efficiency The project is not expected to achieve most of its global environment objectives
<b>Highly Unsatisfactory (U)</b>	The project had severe shortcomings The project has failed to achieve any of its major environment objectives

Or Not Applicable (N/A); Unable to Assess (U/A)

### Note

**Overall Outcome:** Achievement of the project objective will be rated HS to U.

**Effectiveness:** Each of the project's three outcomes will be rated HS to U. The colour coding of the individual indicator targets in **Annex 1** will partially help determine the grade. Each of the outcome indicators will also each be given a grade (in the justification column), however the final rating for each of the three outcomes will be due to appropriate weighting in terms of attaining project objectives. This means

that professional judgement of the TE team will also be a key consideration.

**Efficiency:** An overall rating for cost-effectiveness will be provided

#### Rating Scale for Outcome (Relevance)

Relevant (R)	Not relevant (NR)
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#### Rating Scale for Implementing Agency (IA) and Executing Agency (EA) Execution

<b>Highly Satisfactory (HS)</b>	The agency had no shortcomings in the achievement of their objectives in terms of quality of implementation or execution. Implementation of all five given management categories – IA or EA coordination & operational matters, partnership arrangements & stakeholder engagement, finance & co-finance, M&E systems, and adaptive management (work planning, reporting & communications, including update to project design) – has led to an efficient and effective project implementation. The agency can be presented as providing ‘good practice’
<b>Satisfactory (S)</b>	The agency had only minor shortcomings in terms of the quality of implementation or execution. Implementation of most of the five management categories has led to an efficient and effective project implementation
<b>Moderately Satisfactory (MS)</b>	The agency had moderate shortcomings Implementation of some of the five management categories has led to a moderately efficient and effective project implementation
<b>Moderately Unsatisfactory (MU)</b>	The agency had significant shortcomings Implementation of some of the five management categories has not led to efficient and effective project implementation
<b>Unsatisfactory (U)</b>	There agency had major shortcomings in the quality of implementation or execution Implementation of most of the five management categories had not led to efficient and effective project implementation
<b>Highly Unsatisfactory (U)</b>	The agency had severe shortcomings with poor management leading to inefficient and ineffective project implementation

#### Rating Scale for Monitoring & Evaluation

<b>Highly Satisfactory (HS)</b>	The M&E system – its design and implementation had no shortcomings in the support of achieving project objectives. The M&E system was highly effective and efficient and supported the achievement of major global environmental benefits. The M&E system and its implementation can be presented as ‘good practice’.
<b>Satisfactory (S)</b>	The M&E system – its design and implementation had minor shortcomings in the support of achieving project objectives. The M&E system was effective and efficient and supported the achievement of most of the major global environmental benefits, with only minor shortcomings
<b>Moderately Satisfactory (MS)</b>	The M&E system – its design and implementation had moderate shortcomings in the support of achieving project objectives. The M&E system supported the achievement of most of the major relevant objectives, but had significant shortcomings or modest overall relevance
<b>Moderately Unsatisfactory (MU)</b>	The M&E system – its design and implementation had major shortcomings in the support of achieving project objectives. The M&E system supported the achievement of most of the major environmental objectives, but with modest relevance
<b>Unsatisfactory (U)</b>	The M&E system – its design and implementation had major shortcomings and did not support the achievement of most project objectives. The M&E system was not effective or efficient
<b>Highly Unsatisfactory (HU)</b>	The M&E system failed in its design and implementation in terms of being effective, efficient or supporting project environmental objectives or benefits.

### Rating Scale for Sustainability

<b>Likely (L)</b>	Negligible risks to sustainability with key Outcomes achieved by the project closure and expected to continue into the foreseeable future
<b>Moderately Likely (ML)</b>	Moderate risks, but expectations that at least some Outcomes will be sustained
<b>Moderately Unlikely (MU)</b>	Significant risk that key Outcomes will not carry on after project closure, although some outputs should carry on
<b>Unlikely (U)</b>	Severe risks that project Outcomes as well as key outputs will not be sustained

According to UNDP-GEF evaluation guidelines, all risk dimensions of sustainability are critical: i.e., the overall rating for sustainability is not higher than the lowest-rated dimension.

Ratings should take into account both the probability of a risk materializing and the anticipated magnitude of its effect on the continuance of project benefits.

#### Risk definitions:

- a) Whether financial resources will be available to continue activities resulting in continued benefits
- b) Whether sufficient public stakeholder awareness and support is present for the continuation of activities providing benefit
- c) Whether required systems for accountability / transparency & technical know-how are in place
- d) Whether environmental risks are present that can undermine the future flow of the project benefits.

### Rating Scale for Impact

<b>Significant (S)</b>	<b>Minimal (M)</b>	<b>Negligible (N)</b>
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Project Impact is rated as Significant; Minimal or Negligible, but also the positive or negative aspect of the impact will be stated.

Concerning impact, the TE will consider the extent of

- a) Verifiable improvement in ecological status; and/or
- b) Verifiable reductions in stress on ecological systems
- c) Regulatory and policy changes at regional, national and/or local levels

Process indicators will be specified to demonstrate achievement of stress reduction and/or ecological improvement.

Part of the impact assessment, will concern catalytic effect. The TE will consider if the project exhibited

- a) Scaling up (to regional and national levels)
- b) Replication (outside of the project),
- c) Demonstration, and/or
- d) Production of a public good, such as new technologies /approaches)



## Annex 11: Mission Itinerary

Date	Time	Activity	Participates /contact
<b>Sunday July 8<sup>th</sup></b>	13:50 Entebbe	International Consultant Arrival in Entebbe UNDP collect & transfer to hotel	Moses Lutwama <moses.lutwama@undp.org>, Richard Sobey <timosobey@gmail.com>
<b>Monday 9<sup>th</sup> July</b>	0900 – 0930	UNDP Security briefing	
	1000 – 1100	Meeting with the UNDP Unit, Deputy Country Director / UNDP Country Director (Technical / Programme side)	
	1130 - 1230	Review the in-Country Consultation mission schedule	Daniel McMondo, Pascal Okello, Richard Sobey and Michael Mbogga
		Discuss the Inception Report, inc. Itinerary, access to documentation	
	1330-1500	Meeting project implementation team	
	1500 – 1530	Administrative – Invoice approval etc	Jenesta Atuhaire <jenesta.atuhaire@undp.org>,
	1500 -1600	Confirmation of meetings	Michael Mbogga Email: michael.mbogga@gmail.com Phone: +(256)772483723/776489723/704677357 Pascal Okello Email: pascal.okello@undp.org Onesimus Muhwezi onesimus.muhwezi@undp.org
	1600 - 1630	PSC Chairperson	Dr. Robert Rutaagi
	1630 - 1700	Uganda GEF Operational Focal Point	
<b>Tuesday 10<sup>th</sup> July</b>		Public Holiday in Uganda	TE team met to discuss stakeholder consultations
	0900 – 1000	Entebbe weather station	
<b>Wednesday 11<sup>th</sup> July</b>	1000 – 1030	Department of Water Resource Management (DWRM)	SCIEWS Project presentative and Representatives of co-financiers - WB project and Joint Partnership Fund, Joint Water and Environment Sector Support Programme (JWESSP)
		Department of Water Resources Management	SCIEWS representative and Representative for Kyoga Water Management Zone and Catchment-based Water resources Management plans (CbWRMP) for the project area / Kyoga
	1500 - 1600	Ministry of Agriculture, Animal Industries & Fisheries (MAAIF) (inc. ATAAS representative)	
<b>Thursday 12<sup>th</sup> July</b>		Leave for field from Kampala due east Sezibwa-Lugazi, SCOUL, Jinja and Mayuge	Water Management zone - offices for the Kyoga area <u>For each district</u> Local government (District Disaster Committees, Water, Agriculture, Nat. Resources, Meteorology / Climate office) - DRR, EWS, Vulner & hazard mapping SCIEWS local project offices

**Terminal Evaluation Report**

UNDP GEF Strengthening Climate Information and Early warning systems in Uganda

			Climate information producers (inc. receiving national alerts) Climate information disseminators / Sub-county / parish representatives Farmers organisations and farmers <u>Met stations of various types</u> Agromet / Hydrometric stations (visit 2-3 of each not more) Manual Weather stations (2-3 OK) /AWS (not necessary to visit more than 2-3)
		Travel to Tororo arrive by 6PM	
<b>Friday 13<sup>th</sup> July</b>	0900 – 1100	Tororo, Serere	
	1200 - 1400	Sironko, Bulambuli	
	1600 – 1800	Travel to Soroti to arrive by 6PM	
<b>Sat 14<sup>th</sup> July</b>		Soroti and Lira	
	1200 - 1800	Travel to Kitgum via Kotido	
<b>Sun 15<sup>th</sup> July</b>	0800 - 1600	Kitgum, Gulu Adjumani	Gulu Local airport authority
	1600-1800	Cross the ferry at Moyo to west Nile Arrive in Arua by 6PM	
<b>Monday 16<sup>th</sup> July</b>	0900 -	Arua, Nebbi, Pakwach, Masindi	
	1600-1800	Travel to Hoima to arrive 6PM	
<b>Tue 17 July</b>	0900 - 1200	Hoima, Kabarole, Kasese and Kamwenge	Kasese airport authority
	1300 – 1600	Kisoro, Kabale, Ntungamo Mbarara and Rakai	
	1600 - 1800	Travel to Kampala to arrive by 6PM	
<b>Wednesday 18<sup>th</sup> July</b>	0900-1200	Directorate of Environmental Affairs - UNMA & Climate Forecasting Division	Systems demonstration
	1200 – 1300	Department of Relief, Disaster Preparedness & Management (DRDPM)	National Early Warning Data & Documentation Centre & National Emergency Coordination & Operations Centre (NECOC) Courtesy meeting Commissioner DRDPM in OPM
	1300 – 1500	Department of Relief, Disaster Preparedness & Management (DRDPM) Meeting Senior Disaster Officer	Solomon Elungat
<b>Thursday 19<sup>th</sup> July</b>	0900 - 1400	Stakeholder seminar; Presentation of Field mission and preliminary findings	Onesimus Muhwezi/Pascal Okello National stakeholders
	1500 – 1700	Exit debrief Project Team	Michael Mbogga
	1500 – 1700	TE team meets SCIES Project manager	Pascal O. Okello
<b>Friday 20<sup>th</sup> July</b>	0900 – 1100	Project implementation team – GEF Questionnaire	Pascal O. Okello <pascal.okello@undp.org>,
	1000-1200	TE in UNDP, Admin	
	1400-1500	Exit Debrief UNDP Senior Management	
	1500- 16.30	National Meteorology center (NMC) in Entebbe	Moses
	16:30 depart	UNDP to transfer - Int'l Consultant return – check-in 19:00	

## **Annex 12: Additional (Field) notes**

### **Community-managed AWS - difficulties**

Taking Ongino sub-county, Kumi District as an example, on project completion, an ActionAid AWS was transferred to UNMA. The AWS is a Davis station which needs a connected computer / internet as it is not telemetry equipped. This means that the data logger records for one month then reverts and starts again, so data be downloaded or lost. On handover, the AWS worked for three months then broke down with the following issues: solar panel issue so they were replaced with batteries, but a new deep cell battery would cost US\$150 or connect to mains electricity; also electricity for the computer was on 'pay as you go' and not always paid, so data couldn't always be received / sent via the internet; and finally the computer was lost.

It was also noted that an Adcon AWS was located nearby at Ngora so tailored information could be obtained in any case. Thus, the inference is that a new technology has superseded the old and the station should probably be decommissioned.

### **Ongino village**

The Ongino village area in Kumi is one of low fertility with low rainfall which equates to crop stress. The area is drought prone, harvests are low, and there are many crop / livestock pests (cassava disease, sweet potato, Fall army worm, foot & mouth). There is one extension worker for the district to cover 16 parishes with 36 villages.

The villagers receive some CI via radio, but it is not considered accurate by them (note that they had their own AWS and now have a nearby Adcon unit, but the CI from these units was / is not being transposed to the farmers, despite an AA project here until recently). They generally receive CI from Mbale. The villagers consider CI from the extension officer to be too slow, with monthly bulletins missed and not reliable regarding the rains. The bulletins need translation. The WhatsApp CI is general for Eastern Central and not specific enough. The village has a community development officer, various farmer groups and receives support from the parish, with a disaster relief channel from LC1 to LC5 existing. The EWS worked concerning Fall Army Worm with support from the DPD. Feedback was sent up twice a week once the issue was known, with traps also provided.

### **Bulambuli District – a flood-risk area**

The district needs drainage channels on differing levels to avoid floods. During the dry season the ground is too hard to dig trenches, but once it rains flash floods are common. Seasonal forecasts are received as pre-season alerts. The rains came in early March and not April, with the crops now dry in July.



## Annex 14: Indicative TE Evaluation Matrix

This questionnaire was used as a general aid during the field visit with the results described in section 3. (Note there is no further information to be presented in the blank boxes.)

Evaluation Question	Response / Finding	Conclusion/ Recommend
<b>Relevance: How does the project relate to the main objectives of the GEF FA, and to the environment and development priorities at the local, regional and national levels?</b>		
<b>Effectiveness: To what extent have the expected outcomes and objectives of the project been achieved?</b>		
<b>Efficiency: Was the project implemented efficiently, in-line with international and national norms and standards?</b>		
<b>Sustainability: To what extent are there financial, institutional, social-economic, and/or environmental risks to sustaining long-term project results?</b>		
<b>Impact: Are there indications that the project has contributed to, or enabled progress toward, reduced environmental stress and / or improved ecological status</b>		
<b>Findings discussion – 3 areas - Project formulation, project implementation, and project results.</b>		
<b>Project Strategy</b>		
<b>Project Design:</b>		
To what extent is the project in line with national and local priorities?		
To what extent is the Project aligned to the main objectives of the GEF focal area?		
Have synergies with other projects and initiatives been incorporated in the design?		
Were lessons from other relevant projects properly incorporated into the project design?		
Decision-making processes: were perspectives of those who would be affected by project decisions, those who could affect the outcomes, and those who could contribute information or other resources to the process, taken into account during project design processes?		
Have issues materialized due to incorrect assumptions or changes to the context to achieving the project results as outlined in the Project Document?		
<b>Results Framework:</b>		
Are the project objective / outcomes clear, practicable, & feasible within its time frame?		
Were the project's logframe indicators and targets appropriate?		
How "SMART" were the midterm and end-of-project targets (Specific, Measurable, Attainable, Relevant, Time-bound)? Any amendments?		
<b>Progress towards Results</b>		
<b>Progress towards Outcomes Analysis:</b>		
Review the logframe indicators against delivery at end-of-project targets using the Results Matrix (see Annex).		
Compare and analyse the GEF Tracking Tool at the Baseline, MTR and End.		
Which barriers hindered achievement of the project objective		
<b>PROJECT FORMULATION</b>		
Were the project's objectives and components clear, practicable and feasible within its time frame?		
Were the capacities of the executing institution(s) and its counterparts properly considered when the project was designed?		
Were lessons from other relevant projects properly incorporated in the project design?		
Were the partnership arrangements properly identified and roles and responsibilities negotiated prior to project approval?		
Were counterpart resources (funding, staff, and facilities), enabling legislation, and adequate project management arrangements in place at project entry?		
Were the project assumptions and risks articulated in the PIF and project document?		
Whether the planned outcomes were SMART		
<b>ASSUMPTIONS AND RISKS</b>		
As per logframe - Logical and robust, and have helped to determine activities and planned outputs.		
Externalities (i.e. effects of climate change, global economic crisis, etc.) which are relevant to the findings.		
<b>Project Implementation &amp; Adaptive Management</b>		
<b>GEF Partner Agency / Implementing Entity – UNDP</b>		
Has there been an appropriate focus on results?		
Has the UNDP support to the Executing Agency/Implementing Partner and Project Team been adequate?		
Has the quality and timeliness of technical support to the Executing Agency/ Implementing Partner and Project Team been adequate?		
How has the responsiveness of the managing parties to significant implementation problems (if any) been?		
Has overall risk management been proactive, participatory, and effective?		
Are there salient issues regarding project duration, for instance to note project delays? And, how have they affected project outcomes and sustainability?		
Candor and realism in annual reporting		
<b>Executing Agency/ Implementing Partner Execution - WCS:</b>		
Were the capacities of the executing institution(s) and its counterparts properly considered when the Project was designed?		
Were partnership arrangements properly identified and roles and responsibilities negotiated prior to Project approval?		
Were counterpart resources, enabling legislation, and adequate project management arrangements in place at Project entry?		

Have management inputs and processes, including budgeting and procurement been adequate?		
Has there been adequate mitigation and management of environmental and social risks as identified through the UNDP Environmental and Social screening procedure?		
Whether there was an appropriate focus on results and timeliness?		
Quality of risk management?		
Candor and realism in reporting?		
Government ownership (when NEX) or level of support if 'in cooperation with' the IP.		
<b>Work Planning / PROJECT IMPLEMENTATION</b>		
Effective partnerships arrangements established for implementation of the project with relevant stakeholders involved in the country/region, including the formation of a Project Board.		
Lessons from other relevant projects incorporated into project implementation.		
Feedback from M&E activities used for adaptive management.		
Has the project experienced delays in start-up and/or implementation? What were the causes of the delays? And, have the issues been resolved?		
Were work-planning processes results-based?		
Did the project team use the results framework/ logframe as an M&E and a management tool?		
Were there any changes to the logframe since project start, and have these changes been documented and approved by the project board?		
<b>FINANCE &amp; CO-FINANCE</b>		
<u>Prodoc</u> Did the prodoc identify potential sources of co-financing as well as leveraged and associated financing? Prodoc include strong financial controls that allowed the project management to make informed decisions regarding the budget, allow for the timely flow of funds and for the payment of project deliverables Did the prodoc demonstrate due diligence in the management of funds, including periodic audits.		
Sufficient clarity in the reported co-financing to substantiate in-kind and cash co-financing from all listed sources. The reasons for differences in the level of expected and actual co-financing. The extent to which project components supported by external funders were integrated into the overall project. Effect on project outcomes and/or sustainability from the extent of materialization of co-financing. Evidence of additional, leveraged resources that have been committed as a result of the project. (Leveraged resources can be financial or in-kind and may be from other donors, NGOs, foundations, governments, communities or the private sector)		
<u>Cost-effective factors</u> Compliance with the incremental cost criteria and securing co-funding and associated funding. Project completed the planned activities and met or exceeded the expected outcomes in terms of achievement of Global Environmental and Development Objectives according to schedule, and as cost-effective as initially planned. The project used either a benchmark approach or a comparison approach (did not exceed the costs levels of similar projects in similar contexts)?		
<u>Standard Finance questions</u> (see MTR) Have strong financial controls been established allow the project management to make informed decisions regarding the budget at any time, and allow for the timely flow of funds and the payment of satisfactory project deliverables?		
Are there variances between planned and actual expenditures? If yes, what are the reasons behind these variances?		
Has the project demonstrated due diligence in the management of funds, including annual audits?		
Have there been any changes made to the fund allocations as a result of budget revisions? Assess the appropriateness and relevance of such revisions.		
Has pledged cofinancing materialized? If not, what are the reasons behind the cofinancing not materializing or falling short of targets?		
<b>Project-level Monitoring and Evaluation Systems</b>		
The quality of the Monitoring and Evaluation (M&E) plan's design and implementation: An M&E plan should include a baseline (including data, methodology, etc.), SMART indicators and data analysis systems, MTR, TE, and adequate funding for M&E activities.		
M&E plan at project start up, considering whether baseline conditions, methodology and roles and responsibilities are well articulated. Is the M&E plan appreciated? Is it articulated sufficiently to monitor results and track progress toward achieving objectives?		
Were sufficient resources allocated effectively to M&E?		
Were there changes to project implementation / M&E as a result of the MTR recommendations?		
Are the M&E systems appropriate to the project's specific context? - effectiveness of monitoring indicators from the project document for measuring progress and performance		
Do the monitoring tools provide the necessary information? Do they involve key partners? Are they aligned or mainstreamed with national systems? Do they use existing information? Are they efficient? Are they cost-effective?		
To what extent has the Project Team been using inclusive, innovative, and participatory monitoring systems?		
To what extent have follow-up actions, and/or adaptive management measures, been taken in response to the PIRs? Check to see whether APR/PIR self-evaluation ratings were consistent with the MTR and TE findings. If not, were these discrepancies identified by the project steering committee and addressed?		
Compliance with the progress and financial reporting requirements/ schedule, including quality and timeliness of reports		
The value and effectiveness of the monitoring reports and evidence that these were discussed with stakeholders and project staff		

The extent to which development objectives are built into monitoring systems: How are perspectives of women and men involved and affected by the project monitored and assessed?		
How are relevant groups' (including women, indigenous peoples, children, elderly, disabled, and poor) involvement with the project and the impact on them monitored?		
Has there been adequate mitigation and management of environmental and social risks as identified through the UNDP Environmental and Social screening procedure?		
<b>STAKEHOLDER ENGAGEMENT</b>		
Are the interactions as per the prodoc? Stakeholder interactions include information dissemination, consultation, and active participation in the project.		
Project management: Has the project developed and leveraged the necessary and appropriate partnerships with direct and tangential stakeholders?		
Participation and country-driven processes: Do local and national government stakeholders support the objectives of the project? Do they continue to have an active role in project decision-making that supports efficient and effective project implementation?		
Participation and public awareness: How has stakeholder involvement and public awareness contributed to the progress towards achievement of project objectives?		
Are there any limitations to stakeholder awareness of project outcomes or to stakeholder participation in project activities? Is there invested interest of stakeholders in the project's long-term success and sustainability?		
<b>Reporting:</b>		
How have adaptive management changes been reported by the Project Team and shared with the Project Board?		
How well have the Project Team and partners undertaken and fulfil GEF reporting requirements (i.e. how have they addressed poorly-rated PIRs?), and suggest trainings etc. if needed?		
How have PIRs been shared with the Project Board and other key stakeholders?		
How have lessons derived from the adaptive management process been documented, shared with key partners and internalized by partners, and incorporated into project implementation?		
<b>Communication:</b>		
Internal project communication with stakeholders: Is communication regular and effective? Are there key stakeholders left out of communication? Are there feedback mechanisms when communication is received? Does this communication with stakeholders contribute to their awareness of project outcomes and activities and long-term investment in the sustainability of project results?		
External project communication: Are proper means of communication established or being established to express the project progress and intended impact to the public (is there a web presence, for example? Or did the project implement appropriate outreach and public awareness campaigns?)		
Are there possibilities for expansion of educational or awareness aspects of the project to solidify a communications program, with mention of proper funding for education and awareness activities? What aspects of the project might yield excellent communications material, if applicable?		
<b>ADAPTIVE MANAGEMENT</b>		
Changes in the environmental and development objectives of the project during implementation, why these changes were made and what was the approval process. Causes for adaptive management: a) original objectives were not sufficiently articulated; b) exogenous conditions changed, due to which a change in objectives was needed; c) project was restructured because original objectives were overambitious; d) project was restructured because of a lack of progress;		
How these changes were instigated and how these changes affected project results: - Did the project undergo significant changes as a result of recommendations from the MTR? Or as a result of other review procedures? Explain the process and implications. - If the changes were extensive, did they materially change the expected project outcomes? - Were the project changes articulated in writing and then considered and approved by the project steering committee?		
<b>PROJECT RESULTS</b>		
A 'result' is defined as a describable or measurable development change resulting from a cause-and-effect relationship. In GEF terms, results include direct project outputs, short- to medium-term outcomes, and longer-term impact including global environmental benefits, replication effects, and other local effects. Assess the results based management (RBM) chain, from inputs to activities, to outputs, outcomes and impacts.		
Assess the project results using indicators and relevant tracking tools		
<b>BROADER ASPECTS OF PROJECT OUTCOMES</b>		
<b>Country Ownership</b>		
Project concept had its origin within the national sectoral and development plans?		
Have Outcomes (or potential outcomes) from the project have been incorporated into the national sectoral and development plans? Has the government enacted legislation and/or developed policies and regulations in line with the project's objectives?		
Relevant country representatives (e.g., governmental official, civil society, etc.) were actively involved in project identification, planning and/or implementation, part of steering committee?		
Was an intergovernmental committee given responsibility to liaise with the project team, recognizing that more than one ministry should be involved?		
The recipient government has maintained financial commitment to the project?		
<b>Mainstreaming (Broader Development and Gender)</b>		
Whether broader development and gender issues had been taken into account in project design and implementation?		
In what way has the project contributed to greater consideration of gender aspects, (i.e. project team composition, gender-related aspects of environmental impacts, stakeholder outreach to women's groups, etc). If so, indicate how.		
Did the MTR recommend improvements to the logframe with SMART 'development' indicators, including sex-disaggregated indicators and indicators that capture development benefits? - Were these taken up?		

1. Whether it is possible to identify and define positive or negative effects of the project on local populations (e.g. income generation/ job creation, improved natural resource management arrangements with local groups, improvement in policy frameworks for resource allocation and distribution, regeneration of natural resources for long term sustainability).		
2. If the project objectives conform to agreed priorities in the UNDP country programme document (CPD) and country programme action plan (CPAP).		
3. Whether there is evidence that the project outcomes have contributed to better preparations to cope with natural disasters.		
The mainstreaming assessment should take note of the points of convergence between UNDP environment-related and other development programming.		
<b>Sustainability</b>		
<b>Risk Management</b>		
Are the risks identified in the Project Document, Annual Project Review/PIRs and the ATLAS Risk Management Module the most important? And, are the risk ratings applied appropriate and up to date? If not, explain why.		
<b>Financial Risks to Sustainability (of the project outcomes)</b>		
What is the likelihood of financial and economic resources not being available once the GEF assistance ends? (This might include funding through government - in the form of direct subsidies, or tax incentives, it may involve support from other donors, and also the private sector. The analysis could also point to macroeconomic factors.)		
What opportunities for financial sustainability exist?		
What additional factors are needed to create an enabling environment for continued financing?		
Has there been the establishment of financial and economic instruments and mechanisms to ensure the ongoing flow of benefits once the GEF assistance ends (i.e. from the public and private sectors, income generating activities, and market transformations to promote the project's objectives)?		
<b>Socio-Economic Risks to Sustainability:</b>		
Are there social or political risks that may threaten the sustainability of project outcomes?		
What is the risk that the level of stakeholder ownership (including ownership by governments and other key stakeholders) will be insufficient to allow for the project outcomes/benefits to be sustained?		
Do the various key stakeholders see that it is in their interest that the project benefits continue to flow?		
Is there sufficient public/ stakeholder awareness in support of the project's long-term objectives?		
Have lessons learned been documented by the Project Team on a continual basis?		
Are the project's successful aspects being transferred to appropriate parties, potential future beneficiaries, and others who could learn from the project and potentially replicate and/or scale it in the future?		
<b>Institutional Framework and Governance Risks to Sustainability:</b>		
Do the legal frameworks, policies, governance structures and processes pose risks that may jeopardize project benefits?		
Has the project put in place frameworks, policies, governance structures and processes that will create mechanisms for accountability, transparency, and technical knowledge transfer after the project's closure?		
How has the project developed appropriate institutional capacity (systems, structures, staff, expertise, etc.) that will be self-sufficient after the project closure date?		
How has the project identified and involved champions (i.e. individuals in government and civil society) who can promote sustainability of project outcomes?		
Has the project achieved stakeholders' (including government stakeholders') consensus regarding courses of action on project activities after the project's closure date?		
Does the project leadership have the ability to respond to future institutional and governance changes (i.e. foreseeable changes to local or national political leadership)? Can the project strategies effectively be incorporated/mainstreamed into future planning?		
<b>Environmental Risks to Sustainability:</b>		
Are there environmental factors that could undermine and reverse the project's outcomes and results, including factors that have been identified by project stakeholders? E.g. climate change risk to biodiversity		
<b>Impact - Progress towards the achievement of impacts</b>		
Verifiable improvements in ecological status (or via process indicators to show it is likely in the future)?		
Verifiable reductions in stress on ecological systems (via process indicators)?		
E.g. as a result of the project, there have been regulatory and policy changes at regional, national and/or local levels? (Use tracking tools and indications from baseline to target)		
Identify the mechanisms at work (i.e. the causal links to project outputs and outcomes);		
Assess the extent to which changes are taking place at scales commensurate to natural system boundaries; and		
Assess the likely permanence (long lasting nature) of the impacts.		
On the basis of the outcome and sustainability analyses, identify key missing elements as that are likely to obstruct further progress.		
<b>Theory of Change</b> – Identify project intended impacts – verify logic – analyse project outcome to impact pathway		
Based on the theory of change (building blocks, catalysts etc), has the progress towards impact has been significant, minimal or negligible.		
<b>Catalytic role</b>		
Scaling up - Approaches developed through the project are taken up on a regional / national scale, becoming widely accepted, and perhaps legally required		
Replication - Activities, demonstrations, and/or techniques are repeated within or outside the project, nationally or internationally		
Demonstration - Steps have been taken to catalyze the public good, for instance through the development of demonstration sites, successful information dissemination and training		
Producing a public good –		
(a) The lowest level of catalytic result, including for instance development of new technologies and approaches.		
(b) No significant actions were taken to build on this achievement, so the catalytic effect is left to 'market forces'		



## Annex 15: Signed UNDP Code of Conduct Agreement Form

### Evaluators:

1. Must present information that is complete and fair in its assessment of strengths and weaknesses so that decisions or actions taken are well founded.
2. Must disclose the full set of evaluation findings along with information on their limitations and have this accessible to all affected by the evaluation with expressed legal rights to receive results.
3. Should protect the anonymity and confidentiality of individual informants. They should provide maximum notice, minimize demands on time, and: respect people's right not to engage. Evaluators must respect people's right to provide information in confidence, and must ensure that sensitive information cannot be traced to its source. Evaluators are not expected to evaluate individuals, and must balance an evaluation of management functions with this general principle.
4. Sometimes uncover evidence of wrongdoing while conducting evaluations. Such cases must be reported discreetly to the appropriate investigative body. Evaluators should consult with other relevant oversight entities when there is any doubt about if and how issues should be reported.
5. Should be sensitive to beliefs, manners and customs and act with integrity and honesty in their relations with all stakeholders. In line with the UN Universal Declaration of Human Rights, evaluators must be sensitive to and address issues of discrimination and gender equality. They should avoid offending the dignity and self-respect of those persons with whom they come in contact in the course of the evaluation. Knowing that evaluation might negatively affect the interests of some stakeholders, evaluators should conduct the evaluation and communicate its purpose and results in a way that clearly respects the stakeholders' dignity and self-worth.
6. Are responsible for their performance and their product(s). They are responsible for the clear, accurate and fair written and/ or oral presentation of study limitations, findings and recommendations.
7. Should reflect sound accounting procedures and be prudent in using the resources of the evaluation.

### Evaluation Consultant Agreement Form

Agreement to abide by the Code of Conduct for Evaluation in the UN System

Name of Consultants: Michael Mbogga, Richard Sobey

We confirm that we have received and understood and will abide by the United Nations Code of Conduct for Evaluation.

Signature:

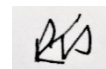
Signed in \_1<sup>st</sup> July 2018, Kampala

Signed in UK on 1<sup>st</sup> July 2018, UK



**Michael Mbogga**

National Consultant / Team Specialist



**Richard Sobey**

International Consultant, Team Leader

### Annex 16: Signed TE Final Report Clearance Form

<b>Terminal Evaluation Report Reviewed and Cleared By:</b>	
<b>Commissioning Unit</b>	
Name:	
Signature:	Date:
<b>UNDP-GEF Regional Technical Advisor</b>	
Name:	
Signature:	Date:

## Annex 17: Terms of Reference

### TERMS OF REFERENCE FOR AN INTERNATIONAL CONSULTANT FOR TERMINAL EVALUATION OF THE EARLY WARNING PROJECT

<b>Location:</b>	Kampala
<b>Application Deadline:</b>	15 <sup>th</sup> March 2018
<b>Description of the assignment:</b>	Terminal Evaluation of the Strengthening Climate Information and Early warning systems in Uganda
<b>Additional Category:</b>	Climate Change Adaptation
<b>Type of Contract:</b>	Individual Consultant
<b>Languages Required:</b>	English
<b>Starting date:</b>	Upon signing of contract
<b>Expected Duration of Assignment:</b>	30 working days

### BACKGROUND

As climate change unfolds globally, the frequency and intensity of climate related disasters is expected to increase. Uganda is one of the countries in Africa that has been considered vulnerable to the increasing frequency and severity of droughts, floods and severe storms (hail, thunder, lightning and violent winds), and their impacts on sectors such as agriculture, fisheries, as well as infrastructure. Such climate-related hazards are having increasingly adverse effects on the country and future climate change is likely to further exacerbate the situation. A large proportion of the Ugandan population has a low capacity to adapt to climate change. Climate change impacts are likely to be particularly negative on Uganda's rural population because of their high dependence on rain-fed agriculture and natural resource-based livelihoods. Uganda's capacity to adapt to climate-related hazards should therefore be developed to limit the negative impacts of climate change and effectively address the country's socio-economic and developmental challenges.

These changes in climate and weather conditions required reliable and timely early warning information to enable planning at both the policy and end-user levels. It is for this reason that the United Nations Development Programme (UNDP) in Uganda with funding from the Global Environment Facility (GEF) has since 2013 been supporting the Government of Uganda to improve on the infrastructure and systems for improving the weather, climate, disaster preparedness and disaster management in the country. The GoU/UNDP's "Strengthening Climate Information and Early Warning System (SCIEWS) project in Uganda" has been implemented by the Ministry of Water and Environment's Uganda National Meteorological Authority (UNMA) and the Department of Water Resource Management (DWRM), in collaboration with key responsible partners including: the Department of Relief, Disaster Preparedness and Management (DRDPM) in the Office of the Prime Minister (OPM); the Ministry of Agriculture, Animal Industries and Fisheries (MAAIF), the Ministry of Local Governments; the Uganda Communications Commission (UCC), and the Ministry of Finance Planning and Economic Development as the Donor Coordinator. The project has been implemented across the country, with pilot testing of its results in 28 Districts from four sub-regions of Elgon, Karamoja, Teso and Lango mostly in Eastern Uganda.

During implementation of the SCIEWS project, over ten consultancies were undertaken to inform project planning as well as to enrich systems development. A mid-term evaluation of the project was undertaken in 2016 and a Financial Audit in the first quarter of 2017.

The project has two main Outcomes of the project have been:

**Outcome 1:** Enhanced capacity of the DoM and DWRM to monitor and forecast extreme weather, hydrology and climate change.

**Outcome 2:** Efficient and effective use of hydro meteorological and environmental information for making early warnings and long-term development plans.

The TE will be conducted according to the guidance, rules and procedures established by UNDP and GEF as reflected in the UNDP Evaluation Guidance for GEF Financed Projects.

The main objective of this evaluation is to assess the achievement of project results, and to draw lessons that can both improve the sustainability of benefits from this project, and aid in the overall enhancement of UNDP programming.

### SCOPE OF WORK AND DELIVERABLES

## Scope of work and methodology

UNDP through the GEF funded 'Strengthening Climate Information and Early Warning Systems,' project intends to recruit an international consultant to assess the achievements of project results, and to draw lessons that can both improve the sustainability of benefits from this project, and aid in the overall enhancement of UNDP programming.

The consultant's scope of work will consist of the following tasks:

The evaluation must provide evidence-based information that is credible, reliable and useful. The evaluator is expected to follow a participatory and consultative approach ensuring close engagement with Government counterparts, the GEF Operational Focal Point, UNDP Country Office, Project Management Team, UNDP GEF Technical Adviser based in the region and key stakeholders. The evaluator is expected to conduct a field mission to UGANDA, including the following project sites and partners:

Gulu, Kitgum, Adjumani, Lira, Kotido, Arua, Nebbi, Pakwach, Mayuge, Jinja, Tororo, Sironko, Bulambuli, Soroti, Serere, Entebbe, Kampala, Lugazi(Sezibwa), Kabarole, Hoima, Masindi, Kisoro, Rakai, Mbarara, Kabale, Ntungamo, Kasese, Kamwenge, Bushenyi. Interviews will be held with the following organizations and individuals at a minimum: Staff of Uganda national Meteorological authority (UNMA), Directorate of water resources management (DWRM), Local Government staff at the Districts where the equipment were installed and sub-national activities undertaken, Staff of Civil aviation Authority(CAA), farmers and other beneficiaries of the Early warning information in the pilot Districts, The Ministry of Agriculture, Animal Industry and Fisheries(MAAIF), Ministry of Local Government, The GEF Focal Person in the Ministry of Finance Planning and Economic Development (MAAIF), The Uganda Communications Commission (UCC); Makerere University (WIMEA project), the private sector (Total Uganda, Mobile Telecom. Companies, SCOUT, FIT Uganda).

The evaluator will review all relevant institutional information, such as the project document, project reports – including Annual Performance Reports for the past four years, project budget revisions, midterm review, progress reports, and GEF focal area tracking tools, project files, national strategic and legal documents, reports of consultancies undertaken and any other materials that the evaluator considers useful for this evidence-based assessment. The Project Management team will provide the evaluator with a list of documents for the desk review, to inform the inception reporting.

### Deliverables:

Deliverable/Activity	Timing	Completion Date
Preparation/Inception	4 days	
Evaluation Mission	14 days	
Draft Evaluation Report	10 days	
Final Report	2 days	

### WORKING ARRANGEMENTS:

#### *Institutional Arrangement*

The Consultant will be supervised by the Country Director UNDP, and technically by the Team Leader for Climate Change and Disaster Resilience in close collaboration with the Project Coordinator.

The Consultant will work closely with the SCIEWS Project Manager, for the day-to-day requirements including access to key program resources and logistical support for the assignment.

#### *Duration of the Work*

The assignment is expected to take a period of 30 working days in accordance with the scope of work and indicative period for submission of deliverables above.

#### *Duty Station*

Home-based, with occasional travel to the field.